ELECTRICAL REVIEW

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ELECTRICAL REVIEW

Vol. CXLVII No. 3808 17TH NOVEMBER, 1950

THE OLDEST ELECTRICAL PAPER ● ESTABLISHED 1872

Rural Electricity

WHO SHOULD MEET THE COST?

FOR the purpose of electricity supply Great Britain (excluding the North of Scotland) was divided into fourteen Areas. It was the aim to secure within the Areas a balance between industrial, domestic and agricultural load so that each could operate as a self-contained system. It was not necessarily the idea that each separate Area should be financially solvent immediately but it could not have been visualized that any of them should persistently rely on external financial aid. In two of the Areas—the Eastern and South Western—the sought-for balance was not attained but those who planned the national scheme no doubt thought that in course of time this would be righted.

Effect of Raising Urban Charges

It is plain, however, that such predominantly rural and sparsely populated territories must take a very long time to develop to the required degree. Moreover, such development will be very expensive and if the resultant capital charges are to be borne entirely by the Areas themselves it is questionable whether financial equilibrium can ever be attained and maintained.

To counterbalance the loss in supplying rural districts, which may be expected for at least some years, charges to other classes of consumers must be raised. There is a limit to this process beyond which there will be an inevitable loss of goodwill and a risk of diminished returns. One possible effect would be to cause industrialists to hesitate to set up new factories in an Area with power charges higher than in other suitable Areas.

The reactions of consumers to suggestions of increased charges are exemplified in the recent appeal by the Eastern Electricity Consultative Council to the British Electricity Authority. This has resulted in a deferment of proposed price increases to enable the Board to re-examine the position.

Outside Financial Assistance

The alternative to this endeavour to make an Area self-supporting is some form of assistance from outside. But surely this should be only temporary—a means of ultimately enabling the Area to stand on its own feet. Continuing subsidies would indicate a need for some radical alteration in the constitution of the Area—an operation not easy to carry out, if possible at all.

There seem to be two ways of rendering this assistance. One of them is presumably already operating : the deficits can be set against the surpluses of more fortunate Boards in the national accounts. This, of course, is implicit in the 1947 Act but it is an expedient which

should not be perpetuated. Already urban consumers are expected to bear any loss on rural supplies in their own Areas. Is it equitable that they should have to take over the burden of the " deficit " Areas as well ?

The alternative is one which we have suggested before. If agriculture is regarded as vital to the nation and if production can be expanded and improved by electrification then surely the cost should be borne by the nation and not by the electricity consumer as a tax upon his consumption. This is recognized by several overseas Governments (notably that of the Irish Republic) which make substantial grants towards the cost of rural electrification. These examples might be studied by the British Government if it is not already doing so.

SELF-EXCITING GENERATORS

There is no novelty in the employment of ordinary a.c. induction motors as self-excited asynchronous generators. Investigation of the method continues in this and other countries as is indicated by the article on the subject (on another page) which has come to us from Canada. Its author would be extremely pleased to hear of more interest being devoted to this system of generation. He feels with some confidence that the method will ultimately succeed commercially, but much will depend upon the way in which voltage is to be controlled. A number of ingenious circuits is possible, but the majority would be so costly as well as complicated as to render the whole system impracticable, since it would be cheaper to use a standard alternator in the first place.

QUARTZ RECLAMATION

The electric twinning of quartz, which is difficult to detect when it occurs, renders the natural crystal useless as a radio-frequency oscillator and filter. Measurement of the piezo-electric properties of hot quartz has indicated that one of the piezo-electric constants drops to zero suddenly at the inversion temperature. The two trimmed forms which are produced on cooling through inversion will consequently have differing energies when loaded mechanically in the presence of an electric field. The U.S. National Bureau of Standards is endeavouring to eliminate the defect by combined electrical and mechanical loading. If the method succeeds, systematic reclamation in this way should be of appreciable economic value to the telecommunication and electronic industries.

POWER STATION STAFFS

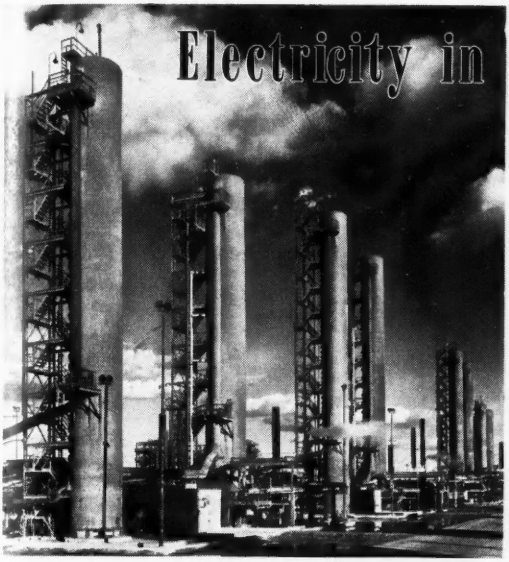
Probably the part of Lord Citrine's speech at the E.P.E.A. dinner which most completely " got under the skin " of his audience was that which revealed a sympathetic understanding of what load-shedding means to those who carry it out. Ill consequences to the public are greatly mitigated, he said, by the judgment shown by system-controlled engineers, station superintendents and charge engineers in making split-second decisions and taking abnormal risks which entail considerable personal strain. While willing acceptance of these responsibilities as part of the day's work is to be expected from members of an Association which, as its president Mr. W. Ingledew pointed out, takes as its Object No. 1 the general advancement of the industry, it is nevertheless good to find so just an appreciation of what is involved in human terms.

BUSINESS RIVALS

Before the electricity supply industry was nationalized some undertakings were members of local Chambers of Commerce. Now some of these Chambers are refusing membership to the local representatives of the Electricity Boards. This is understandable : members engaged in electrical business look on the Boards as competitors and naturally do not wish to encourage them in any way. But there are two other considerations : one is that rivals in business can (and do) find much in common without giving anything away ; the other is that business men may find it advantageous to have this contact with the providers of a service which they all employ.

"ELECTRICAL WHO'S WHO"

Brief biographies of about 2,600 leading men and women in all branches of the industry appear in the " Electrical Who's Who." Copies are obtainable from the *Electrical Review*, Dorset House, Stamford Street, London, S.E.1, or from booksellers, price 12s. 6d. (postage 7d.)



Electricity in the Oil Industry—I

Important Part Played by British Manufacturers

Superfractionators for the production of aviation spirit at the world's largest refinery belonging to the Anglo-Iranian Oil Co., Ltd., at Abadan

FROM no raw material except possibly coal are so many important products derived to-day as from oil. Apart from the various oil products themselves such as motor spirit, white spirit, kerosene (paraffin), diesel oils, lubricating oils and fuel oils, modern refining methods provide—to mention only a few items—gas, waxes, bitumens, paints, asphalt detergents, carbon black, insecticides, p.v.c. and other plastic materials.

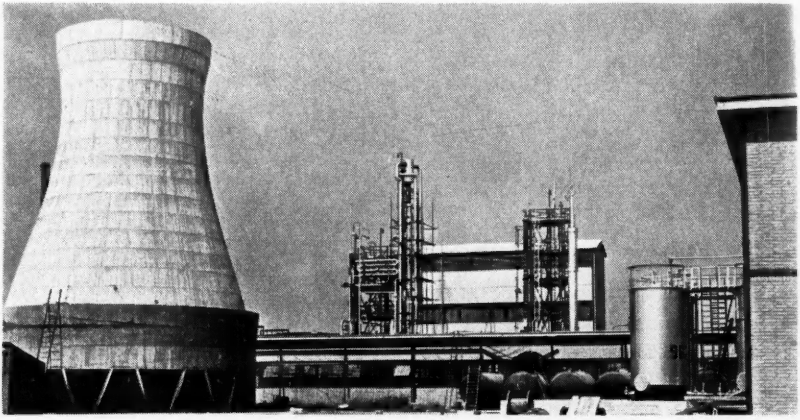
The increasing demand for many of these products, especially for the higher grade spirits, is resulting in intense activity all over the world not only in the development of new or existing oilfields but also in the establishment of additional and improved refining facilities. Further urgency for greater production and more refineries (though recent events have changed the position to some extent) arises from the necessity for sterling countries to render themselves as far as possible independent of oil, especially refined oil, which has usually to be paid for in dollars, or to reduce the dollar element which is contained in all "sterling oil."

In the United Kingdom alone over £125 million is being spent on new refining plants. Completely new installations are being provided at the Isle of Grain, Shell Haven and Coryton on the Thames Estuary, while extensive new plant is being installed at Llandarcy (between Swansea and Neath), Grangemouth (Stirling), Fawley (near Southampton Water) and Stanlow (near Chester).

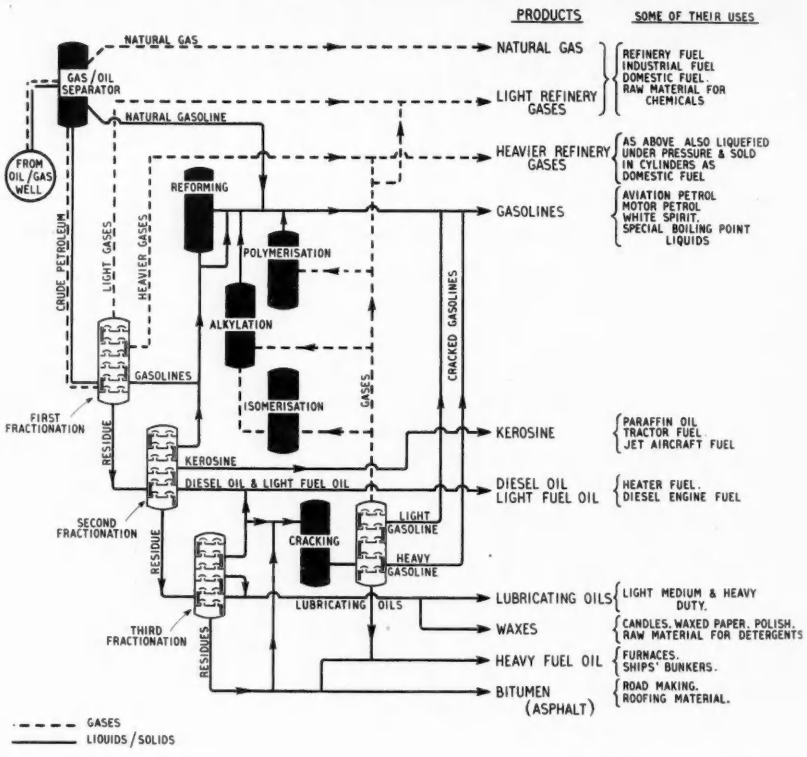
Abroad, refinery schemes in hand include most European countries, Australia, South Africa, Canada, the West Indies, South America and, of course, the United States of America. Important oilfields are being opened up in Canada, Persia, Iraq, Kuwait and Qatar (Arabia), British Borneo, New Guinea and Holland and the search goes on in most countries. The discovery of oil in Alberta and Manitoba opens up further vast possibilities. Altogether it is estimated that Canada will spend $5,000 million on development in the next five years, quite apart from the enormous amounts required for the residential premises, etc., which in some cases represent entirely new towns.

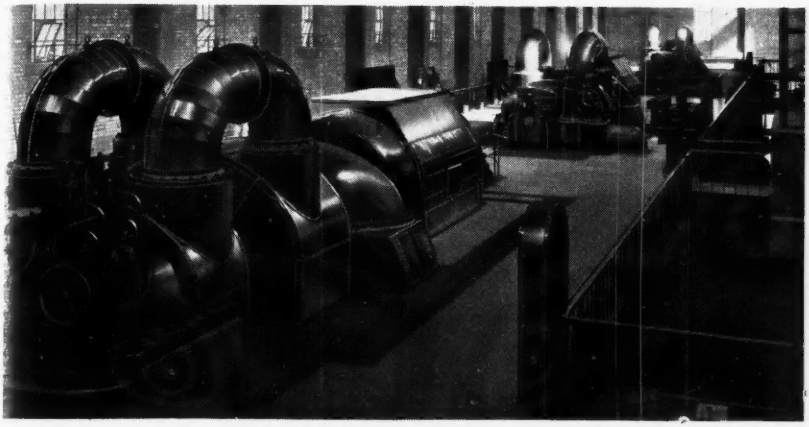
Electrical Plant Requirements

The above details, besides giving an idea of the extent of the world's oil development programme, also serve as an indication of the requirements for electrical plant which, it goes without saying, is indispensable at every stage of production. It has been estimated that in a typical modern oil refinery



P.v.c. factory, pump and compressor building and distilling columns at the Royal Dutch/Shell refinery at Pernis, Rotterdam ; and (below) simplified flow chart from oil well to main petroleum products



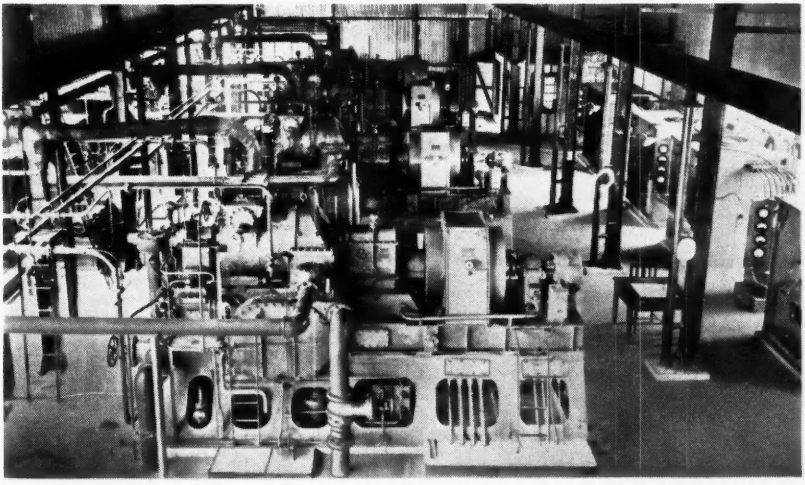


Interior of Abadan power station, Persia

electric motors represent about 1·5 per cent of the total cost, switchgear 1 per cent, instruments, including control valves, 5·2 per cent and wiring installation 2·7 per cent. Electrical equipment therefore accounts for rather over 10 per cent of the cost. The proportion of the cost represented by electrical gear on oilfields is somewhat less but it has been estimated that the international oil industry as a whole will have purchased from 1947 to 1953 approximately £3,250 million worth of equipment, in its expansion and rehabilitation programmes of which a high percentage is represented by electrical equipment.

It can be said that British controlled installations will be equipped with British-made equipment virtually throughout. Apart from the saving in foreign currency, British manufacturers have made an exhaustive

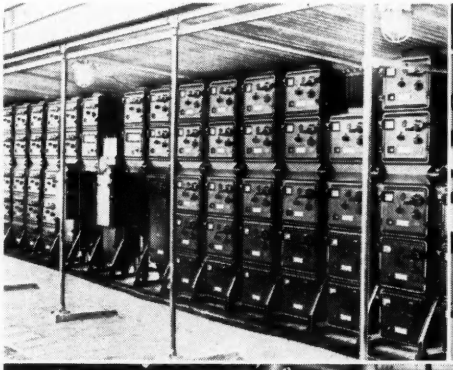
Chauk power station (Burmah Oil Co., Ltd.) showing four B.T.H. 550kW self-contained transportable turbo-alternators

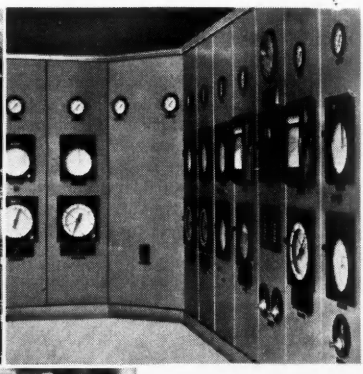


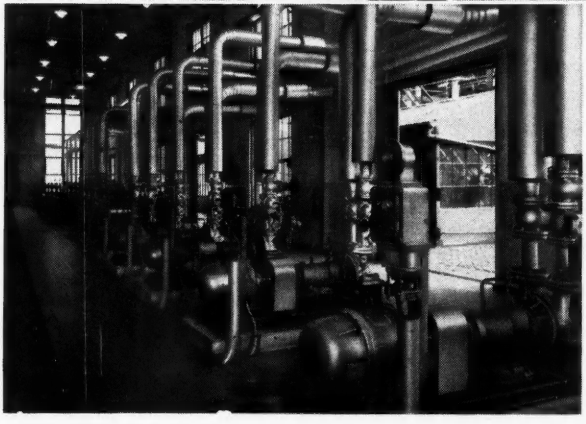
investigation into requirements and offer products which are of at least as high a quality and performance as those of their foreign competitors. Moreover, they can in general offer equally good delivery. British manufacturers, having made a careful study of American methods, are now in a position to supply equipment that is interchangeable with American.

For the above reasons it is to be expected that a larger proportion of British-made plant will be found in foreign controlled or joint schemes now being carried out abroad and it can be anticipated that recent improvements in technique and design of apparatus will further accelerate the demand for British equipment. Considerable activity in co-ordinating the technical development and leadership of the industry is being shown by the Council of British Manufacturers of Petroleum Equipment (whose director until recently was Col. A. S. Osborne).

With the object of seeing for ourselves something of the scope of the schemes in hand and also of judging the extent of the recent progress in the electrical field, we have just visited a number of oilfields and refining installations as well as factories where the electrical equipment is made. In this we are grateful for the co-operation of the Shell, Anglo-Iranian and Anglo-American Oil organizations, the Council of British Manufacturers of Petroleum Equipment and individual electrical plant manufacturers. Our observations will appear in subsequent issues. The photographs were kindly supplied by the Shell, Anglo-Iranian and British Thomson-Houston companies.







Above : A portion of the control room which records temperatures, pressures, flows and levels and automatically controls processes at Shellburn refinery, Vancouver

Top left : A group of seventy-five motor starters mounted under cover out of doors at Pernis

Left : Electrically driven hot-oil pump house in a 3,000 ton per day distillation unit at Pernis

Asynchronous Generators

Simple Theory Without Mathematical Complication

By M. WALKER,* A.M.I.E.E.

THE fact that any standard induction motor can be operated as a self excited asynchronous generator is well known. However, operating difficulties have made this method of generation unattractive with the result that the information on it has been very meagre indeed.

The main difficulty is that of voltage regulation under fluctuating load conditions, but I do not doubt that an efficient and economical control system could be developed which would enable this system of generation to be used commercially. My own efforts in this connection have temporarily been discontinued due to pressure of frequency conversion (25 to 60 c/s) duties, but it is hoped to be able to resume them in the near future. All the points outlined below have been proved by tests in our own laboratories and are really a duplication of the results which were obtained by Mr. C. F. Wagner in the United States.†

Method of Operation

For the sake of simplicity only the single phase motor will be considered here, although the method is applicable to both two- and three-phase operation also.

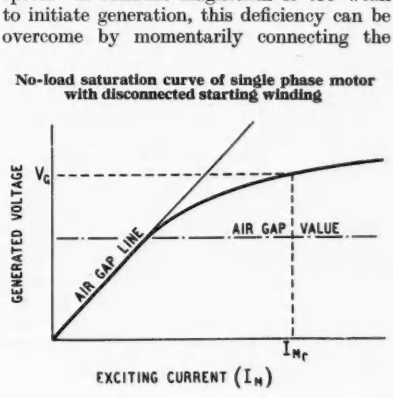
Under normal conditions an induction motor draws a quadrature component of current (commonly denoted as I_M) for excitation purposes and a no-load excitation curve such as that shown below will indicate the magnitude of this current at varying values of input voltage. For practical purposes with most standard motors it is quite sufficient to vary the input voltage and regard the corresponding values of input current as values of I_M. This, of course, neglects the existence of the core-loss and eddy current components.

Conversely now, if the motor is to operate as a generator that is totally independent of any external electrical supply, some means of providing this reactive magnetizing current must be incorporated. A simple means is by connecting condensers across the motor terminals, their volt-ampere rating being equivalent to the volt-amperes required for excitation purposes. By this means the induction generator would provide its own excitation by virtue of the interchange of energy across the parallel circuit formed by the motor magnetizing ampere-turns and the exciting condensers.

Referring to the no-load saturation curve, if it is desired to generate a voltage V_G the necessary exciting current, provided by condensers connected across the motor terminals, would be I_{MC}. The reactance of the condensers would be equal to $\frac{V_G}{I_{MC}}$ and the capacity can be calculated from the standard expression $C\mu_F = \frac{10^6}{2\pi f X}$.

The generated frequency is directly proportional to speed and number of poles as with a standard alternator, except for the fact that slip now becomes negative in sign and must therefore be added to, instead of subtracted from, the value of synchronous speed. If residual magnetism is too weak to initiate generation, this deficiency can be overcome by momentarily connecting the

No-load saturation curve of single phase motor with disconnected starting winding



* Assistant testing engineer, Hydro-Electric Power Commission of Ontario.

† Reported in A.I.E.E. *Transactions*, Vol. 58, 1939.

set, while it is running, to a battery or other suitable supply source.

Conditions Under Load

The function of the shunt connected condensers so far has been solely that of providing the necessary magnetizing current with no electrical load connected to the generator. It must be stated that an induction motor operated as a generator in this way is not capable of supplying reactive power, i.e., it must always operate at unity power factor. If an inductive load is connected to the set, then the value of shunt connected capacity must be increased to furnish the reactive component of load current plus the original value of exciting current. Furthermore, the inherent reactance of the motor windings causes a voltage phase shift under load which, again, has to be corrected by additional capacity. The total function of the condensers is therefore that of correcting all inductive reactance, including that of the generator itself.

If these conditions are not satisfied and an increased load is applied to the generator without immediate increase of capacity, the voltage could decrease until the air gap value of the motor was reached and generation would cease completely.

The primary purpose of any voltage regulator will therefore be that of quickly detecting and correcting any deviations from unity power factor. An ideal method would be to use a variable condenser of small inertia and sufficient capacity range to cater effectively for all loading conditions on the generator. By this means the capacitive reactance could be set to exactly counter-balance the inductive reactance under all conditions of load.

A number of alternative methods are possible, such as transformer or resistance coupling to the condensers. The effective capacity could then be varied by adjusting the amount of coupling; these methods would introduce an additional and quite appreciable load on the generator.

Stability is greatly improved if the machine is made to operate at a point well along the no-load saturation curve, where $\frac{dV_G}{dI_M}$ approaches the minimum value. Along this portion of the curve the voltage variation will be relatively small, even though the exciting current be changed appreciably.

Increasing Productivity

Problems Discussed by Advisory Panel

PROPOSALS for increasing productivity in the electrical industry were discussed by an Advisory Panel of industrial experts representing leading electrical equipment manufacturers at a meeting held at the Melton Mowbray headquarters of the Production Engineering Research Association on 25th October. The Panel raised many long-standing production problems peculiar to the electrical industry and recommended that the Association should undertake research into these subjects.

The Panel began by stressing the need for information which would enable manufacturers to produce high silicon steel stampings more economically. It was also proposed that research should be conducted into a number of aspects of rolling bearings.

The Panel asked P.E.R.A. to investigate the machinability of such materials as boron copper and the recently developed permanent magnet alloys, and endorsed the view of one of its members that the electrical industry would benefit greatly by wider adoption of impact extrusion and powder metallurgy. Other matters dealt with were the speeding-up of operations in polishing of complicated mould cavities, the distortion of plastic moulds during heat treatment, corrosion problems, technique of paint application, research into the blanking of small gears, the machining of stator or rotor laminations, transfer moulding, bonding media such as silicone varnishes, the performance of nitrided cutting tools, etc.

It was announced that some of P.E.R.A.'s present metal cutting researches are being carried out on semi-finished parts supplied by engineering firms. After being machined in the Association's workshops the parts are returned to the firms for use in production.

The members of the Advisory Panel are: Messrs. M. A. Craske (Berkeley & Young); T. A. Eccles (English Electric); D. Edmundson (B.T.H. Co.); A. W. Field (Mawdsley's); J. Gilson (Hoover); G. M. Hall (Ferranti); R. R. Kenderdine (Crompton Parkinson); F. T. Nurrish (George Bray); W. E. Organ (G.E.C.); W. J. Jolly (Automatic Telephone & Electric); A. E. Thompson (Midland Electric Manufacturing); H. Whaile (B.I.P. Tools); and G. T. Dickson (J. A. Crabtree).

ELECTRICAL CONTRACTING: Organization and Routine

By H. R. TAUNTON, A.M.I.E.E.

16.—*The Stores and Stock (contd.)*

A CERTAIN amount of figuring and writing in the stores is not to be avoided. It should, however, be kept to the minimum necessary. The storekeeper is primarily a manual worker, and he should not be expected to fulfil the functions of a skilled accountant. Except in a really big store, where it might be worth while to employ a junior clerk as assistant, the only clerical work that should be done there by its staff is the writing of advice and packing notes and labels, the checking of incoming goods by makers' advices, and the marking up of bin cards. All other work should be the responsibility of the office staff.

The stock list may take either of two forms. The commoner, with which most contractors are content, is no more than a transcript of the result of the annual stocktaking, in which each item is recorded with quantities and prices. A list of this description, showing the value of the stock at the end of the working year, is necessary for accountancy purposes and may be useful for easy reference; but it has the obvious drawback that, while it may show the state of the stock at, say, 31st December, it gives no clue to it at any given later date. Six months later, for instance, it may be a scrap heap or a white elephant.

Perpetual List

Far better is what is known as a "perpetual stock list." Combined with a proper system of bin cards this shows at any time for any item the actual quantity in stock compared with its maximum and minimum limits, at its true value, besides recording all its movements in and out. And in conjunction with the cost ledger, it ensures that every incoming invoice not posted to a contract or job is posted to stock, thus providing a check against omissions and errors. Against the extra clerical work involved may be set the saving of labour occasioned by the annual stocktaking, which it renders superfluous.

The perpetual stock list should be kept as a loose-leaf ledger (or as a card system) with a separate leaf for each item. The leaf should be headed by a full description, and this is best worded in "army" style, e.g., "Switches, flush, 2-way, 5-A." The maker's name and catalogue number should follow, and the bin number, with the agreed maximum and minimum limits.

Four columns are needed—date, folio, "in" and "out"—and they can be repeated two or three times across the page. Quantities taken into, or returned to, stock and those sent out from it are recorded in the "in" and "out" columns respectively against the appropriate date. The folio column is for cost ledger references. No reference is necessary for purchase entries as the maker's name and the date serve for tracing invoices. The blanks thus available in the folio column can be used for a record of the rate (the net cost each) in red ink, which need not be repeated for new lots while the rate remains unchanged.

The Rarer Items

This method of listing stock on ruled sheets would be cumbrous and space-wasting for stock consisting of single or very few items, particularly if they are not to be replaced, e.g., fittings. They can best be grouped on plain sheets of the same size, with date, folio, and cash columns, under some classified heading, such as "Brackets," "Standards," "Instruments," etc. When disposed of, each item can be simply crossed out, the cost ledger reference being noted in the folio column. Showroom stock will necessarily have to be listed mainly on these lines.

In pricing a stock list the only sound rule is to take either the price at which the particular goods were bought or the present market price, whichever is the lower, both as the basis for stocktaking and for the coming year's costing. An exception may be made in the case of a quickly moving

item, if its maker's price has been put up without alteration or improvement of its type.

It would manifestly be very laborious to balance and price all the separate leaves of the stock list whenever it was desired to check its total value with the cost ledger. Something simpler is needed, and this can be provided by a " stock summary account," kept in the cost ledger, and on the same lines as the other accounts in it. All invoices for stock and all returns to stock from jobs are posted to this account and analysed into the classified material columns. Goods sent out are similarly treated—as credits—and each item will, of course, be duplicated as an entry in some cost account.

It will then be an easy matter to arrive at a total for a periodical check. The summary serves to keep the principals advised of the fluctuations of stock; and it also provides an approximate check on the annual stock-taking. It will not agree with it exactly, as it is made up of current invoice figures, whereas the stock at the end of the year will be priced, each item, at a final fixed rate. The necessary adjustment should be made by a suitable book entry, so that it agrees with the figures taken for the balance sheet and so begins the new year in line with the stock lists. Adjustments, too, will have to be made to make the two tally in the matter of quantities and values which have been written off to cover depreciation, losses, and other discrepancies.

Details of Bin Cards

Bin cards are in effect a skeleton stock list kept by the storekeeper, and tallying as to quantities with the official stock list kept in the office, and with which he has nothing to do—although he may have a copy of the annual stock list for reference. To keep his clerical work to a minimum, the best system of bin cards is the simplest. The cards, say about 3in by 2in, of stout manila, can be conveniently in two parts: one permanent, tacked or glued to the bin, the other renewable, in a simple metal frame or holder. The permanent card will carry in large figures the bin number, a precise description of the contents, and, also in bold figures, the agreed maxima and minima. The renewable card may be ruled into rectangles; say 36, for the size suggested.

The quantity in the bin at the time a new card is inserted in the holder is noted in the first space. Whenever a lot is added to, or taken from, the bin, all that the storekeeper has to do is to note—in pencil, preferably indelible, will do—the altered balance in the next space and cancel that in the preceding one: a duty which the most casual will have no excuse for neglecting.

The advantages provided by a bin card system are (*a*) Up-to-the-minute indication of stock quantities. (*b*) Warning of approach to maximum and minimum limits. (*c*) Check on the perpetual stock list kept in the office. (*d*) Avoidance of the laborious counting involved in the annual stocktaking.

If the cards are correctly kept, it will be sufficient to count a few bins at random to check the fact that they *are* kept correctly. The annual stocktaking is then simply a matter of copying the figures shown on each card.

Contact with Office

The smooth functioning of any system of stock-keeping and listing depends on a close liaison between the stores and the office. This liaison consists officially of certain necessary records in writing on standard forms, and may here be conveniently summarized. All movements of stock are initiated—(*A*) If *outwards*, by requisition, (*a*) from foreman; (*b*) from showroom or office. (*B*) Or by credit advice note to suppliers, of surplus material. (*C*) If *inwards*, by order, issued by office. (*D*) Or by return note, from foreman, of surplus material. The forms and the routine connected with them have already been dealt with.

The final records of the above movements, from which the necessary entries in the cost ledger and the stock list are completed, take the form of—(*A*) *Outwards.* An advice note, (*a*) to foreman; (*b*) to customer, with either a cash sales voucher or, in due course, an account. (*B*) A credit note from suppliers for goods returned. (*C*) *Inwards.* An advice note and invoice from suppliers. (*D*) The foreman's return note, after checking by stores and passing to office.

With the system outlined, what the stores staff is called upon to do is purely routine work and exacts nothing but thoroughness and accuracy. The only other clerical work necessarily done by them is—

(*a*) Advising when any item of stock approaches the minimum limit, so that the office may issue the necessary order to renew it.

(*b*) Writing certain orders for jobbing work, if the normal routine of the business

makes it desirable that the storekeeper should be authorized to do this.

(*c*) The keeping of a record of all tools and tackle, the property of the firm, issued and returned.

(*d*) Petty work in connection with parcel books, railway notes, labels, etc.

(*e*) Minor correspondence with suppliers and foremen arising from the routine of the stores. It will obviously be a great assistance to the office staff, relieving them of a mass of detail, if the storekeeper is capable of writing or dictating letters on such matters as delays, errors or shortages in deliveries, or obscurities or other difficulties in requisitions. All such letters should be signed, or at least read before posting, by a responsible member of the office staff.

Storekeeper's Qualifications

In describing his duties we have, by inference, largely suggested what manner of man the storekeeper himself should be. He may be a man who has devoted himself from youth to storekeeping, either in the electrical or some similar trade; or, quite commonly, he may be an ex-wireman who has developed an aptitude for the work. Neatness and method are the two qualities most essential to him, and next a capacity for careful and accurate recording of stock movements.

He should have a wider knowledge than anyone else on the staff of makers' catalogues and their possibilities. That is his speciality, developed by experience. He should be able to suggest the appropriate make and type of any accessory which may be wanted to fill some unusual requirement. Similarly, he should have at his finger-tips the best, quickest, and cheapest sources among local craftsmen of the various specialities commonly called for on contracts: blacksmith's work, castings, metal finishing, joinery, and so on.

For the rest, we need only stipulate a firmness of character which will keep discipline in his stores and intruders out of it—that is where many otherwise excellent men fail—and a conscientiousness which will not allow him to neglect any of the small pains, which, so easily neglected, lead inevitably to confusion, waste, and ultimate loss.

In a store of any size he will need an assistant, who should be competent to take his place in a temporary emergency. If the storekeeper himself is not a mechanic, able on occasion to use a lathe or a drill, it is useful for the assistant to be able to do so. There are plenty of little jobs which can be carried out more quickly and economically in the workshop attached to the store—if there is one—than on the job or by a local mechanic.

A boy, or perhaps two, will complete the stores staff, as general help and messenger. They come and they go, and so long as they are strong and willing not much more can be expected of them. The place of one of them may well be taken from time to time by an apprentice, as a limited part of his training and a valuable experience.

The stores staff must necessarily be skilled in packing. They will have learnt from experience the undesirability of dumping silk shades in sacks, or posting c.i. fittings in cardboard boxes. And the storekeeper at least must have at his finger-ends all the technicalities of despatch. It is important that way-bills shall be correctly filled up. It is easy to make a mistake in the classification of the goods, so that either a needlessly high rate will be charged for them or compensation refused should a claim have to be made later. Discrimination is necessary in sending goods at "company's risk" as against "owner's risk." The difference in rates is appreciable and is not worth paying where the risk of damage is negligible, as it often is.

A parcel book of the standard type should be used by the stores, and signatures obtained, not only for consignments handed to carriers, but for parcels posted and goods delivered to local customers. It is unnecessary for goods delivered by stores direct to a local job, where the foreman's signature on the usual advice note serves the purpose.

Returnable Packing

The problem of "empties"—returnable packing of value—is in many firms a continual irritation, either from lack of system or neglect of what system there is. No firm likes paying for packing; but there should be no need to pay for any that is returnable: it should have been returned. If it goes astray—as it will if its handling is not systematized—the firm must expect to pay the penalty of its happy-go-lucky ways.

The simple remedy is a proper record of the movements of all empties. It adds a little to the storekeeper's clerical work, but that is unavoidable, as only he can keep it properly. All returnable packing advised

by makers should be entered in a "cases book," with owner's name, description and mark, value, date sent to job, advice-note number, date returned to owner, and credit advice-note number, entries being cancelled when credit notes have been received.

Empties should be advised out to jobs and back to owners like any other material, and preferably on separate notes. A foreman should be told promptly what packing is returnable, and its value impressed upon him—it may prevent him breaking up a 20s case to boil a dixie of tea. A man will sometimes use a maker's case to return material to the store, and the storekeeper will do the same to send it to a job. If this rather illegitimate use of other people's packing is carried too far, full credit cannot reasonably be expected when it is eventually returned.

In spite of every check, empties may be lost through some accident; but it is rarely necessary to pay the full amount charged for them. It is purely a nominal one, overstated to secure their return, and owners will usually be found willing to accept a compromise nearer their actual cost.

Domestic Installations

Good and Adequate Wiring Essential

IN his inaugural address as the new chairman of the Northern Ireland Centre (Belfast) of the Institution of Electrical Engineers, Mr. R. P. Watson (Belfast Corporation Electricity Department) spoke of the growth of domestic electrification. Fortunately, he said, the post-war flood of indifferent equipment was abating, but the problem of compliance with minimum standards of proficiency in installation work remained. Only legislation similar to that in other countries would, in Mr. Watson's opinion, safeguard the user of electricity in respect of good workmanship.

Mr. R. P. Watson

An installation was as good as the facilities it offered for the employment of electricity for all foreseeable purposes. Too often the layout of the wiring system was left to chance, or considered only after the building was designed. As to the type of wiring, the ring-main principle for socket outlets afforded flexibility, made possible a considerable saving in the amount of cable employed and permitted additional sockets to be fitted later at small expense.

It was estimated that electricity was employed for cooking in less than 20 per cent of the wired dwellings in the U.K. There alone in houses already connected to the mains vast opportunities for load development presented themselves. If, however, electricity was to compete successfully with its rivals in the domestic sphere, not only must it be capable of offering the same or better facilities, at equal or less cost, but the public must be made aware of the fact. There was a prevalent, though mistaken, idea that electricity was costly to employ otherwise than for those purposes for which it was acknowledged to have a monopoly. Equitable comparison could not be made with other media, as electricity was not a substitute for them; it had attributes peculiar to itself.

There were definite indications that electricity continued to be employed more freely for domestic purposes. At 31st March, 1940, in the Belfast area there were 60,053 domestic consumers on the two-part rateable valuation tariff and during the previous year they consumed 32·3 million kWh, or an average per consumer of 538 kWh. At 31st March, 1950, there were 96,351 consumers on that tariff and the average consumption in the preceding year was 856 kWh, representing an increase of 59 per cent in ten years.

Valve Symbols

THE revised version of B.S.1409 has been made more complete by unification and considerable additions to the range of letter symbols listed for electronic valves, their electrodes, other component parts and the quantities employed, intended mainly for use in manufacturers' literature and catalogues. Copies are obtainable for 2s, post free, from the British Standards Institution, 24, Victoria Street, London, S.W.1.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT a meeting of the B.I.F. Electrical Exhibitors' Committee at Birmingham last week **Mr. W. Percy McGeoch** (W. McGeoch & Co., Ltd.) was elected chairman for the ensuing year. He has been vice-chairman and succeeds **Mr. Raymond Berry** (Berry's Electric, Ltd.). **Mr. W. T. Litchfield** (English Electric Co., Ltd.) was elected vice-chairman. To fill vacancies representatives of A. Reyrolle & Co., Ltd., and Ferranti, Ltd., were elected to the Committee.

Three new appointments have been made in the General Engineering Department of the Metropolitan-Vickers Electrical Co., Ltd. **Mr. F. B. Holt** is appointed assistant chief engineer (industrial), **Mr. D. R. Love,** assistant chief engineer (mining), and **Mr. W. J. Price,** assistant chief engineer (power).

Mr. F. B. Holt, A.M.I.E.E., entered the British Westinghouse drawing office in 1902. From 1908 he specialized in switchgear. Five years later he became chief draughtsman of the switchgear apparatus section and was responsible for designing the "H" type of metal-clad gear, which gave a considerable increase in breaking capacity, initially going up to 350 MVA at 33 kV. From 1917 to 1920 he was chief draughtsman of the Control Department. Following this he was made responsible for setting up a new motor test bed, and he next joined the motor application section of the Motor Department, which later became the industrial section of the General Engineering Department; Mr. Holt was appointed chief textile engineer in 1924 and was placed in charge of the section in 1937.

Mr. D. R. Love, B.Sc., A.M.I.E.E., took his degree at the University of Capetown. His college apprenticeship at M.-V., starting in 1939, was interrupted by the war when he joined the Electrical Branch, R.N.V.R. On demobilization he returned to Trafford Park to complete his course, and in 1946 he entered the mining division of the General Engineering Department.

Mr. W. J. Price, B.Sc.(Eng.), was educated at Wigan Mining and Technical College and obtained a London University external degree. He went to M.-V. as a college apprentice in 1935 (having previously been a vacation apprentice) and on completing his course joined the power and general division of the General Engineering Department.

William McGeoch & Co., Ltd., have appointed **Mr. B. I. Powell** as sales manager. Mr. Powell's previous activities have been in contracting, generation and the electrical branch, R.N., and for some years he was Midland area and branch manager for the Simplex Electric Co., Ltd.

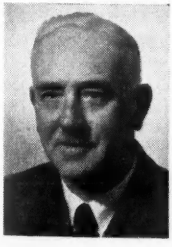
Mr. B. I. Powell

Following the retirement of Mr. J. A. Smith, the number of directors of **Plessey International, Ltd.,** Ilford, Essex, has been increased to five. In addition to Messrs. A. G. Clark and J. F. Mallabar, Messrs. B. G. W. Attwood, E. J. Earnshaw and T. White Wilson have been appointed to the board.

Mr. S. Ferguson, M.I.E.E., founder of Cooke & Ferguson, Ltd., has resigned his position as chairman in order to have more time to devote to his other interests. He remains a director and will be available for consultation and special assignments. **Mr. T. H. Windibank,** M.I.E.E., director of Crompton Parkinson, Ltd., becomes a director and chairman of the board as from 10th November. **Mr. J. R. Ferguson,** son of Mr. S. Ferguson, remains a director and general manager.

Mr. G. W. Alexander, B.Sc., A.M.I.E.E., A.M.I.Min.E., has been appointed chief engineer of Powell Duffryn Technical

Mr. F. B. Holt



Mr. D. R. Love

Mr. W. J. Price

Services, Ltd., as from 1st November. Mr. Alexander was previously chief engineer of the Mining Department of Metropolitan-Vickers Electrical Co., Ltd. **Mr. Ivor Williams,** who has been acting as chief engineer of the Powell Duffryn company, will in future hold the position of chief consulting engineer.

Mr. T. M. Blackburn, retired recently from the position of manager, Halifax District, Yorkshire Electricity Board, because of ill health. Mr. Blackburn joined the Halifax Electricity Department over 40 years ago. From 1923 to 1927 he was with the Yorkshire Electric Power Co., but returned to Halifax and in 1931 was made mains superintendent and became successively distribution engineer and deputy manager. On nationalization he was appointed local manager and later District manager under the Yorkshire Electricity Board. Up to 1930 Mr. Blackburn was a playing member of the Halifax Cricket Club, captaining the side for several seasons, and he has for many years been a member of the Halifax West End Golf Club. A presentation of a radio set has been made on behalf of his colleagues.

Mr. T. M. Blackburn

At its meeting on 4th November, the General Council of the Engineers' Guild elected **Mr. R. Chalmers,** O.B.E., as its first president. Mr. Chalmers recently retired from the position of senior divisional engineer in the Chief Engineer's Department of the London County Council. The chairman of the General Council of the Guild for 1950-51 is **Mr. H. Nimmo,** M.Inst.C.E., M.I.Mech.E., M.I.E.E., chairman of the Southern Electricity Board, and the vice-chairman is **Mr. W. S. Graff-Baker,** A.C.G.I., B.Sc., M.I.Mech.E., chief mechanical engineer (railways), London Transport Executive.

Mr. W. Ballantyne, who has just retired at the age of eighty from work in the Electricity Department of Colville's Steel Works, Motherwell, was recently entertained by his fellow-workers and Mr. J. Weir, manager of the Department, who presented him with an inscribed gold watch. He has served in the Department for thirty-three years.

About 230 northern representatives of the staff of **British Insulated Callender's Cables, Ltd.,** and **British Insulated Callender's Construction Co., Ltd.,** were entertained recently by the management to dinner in Glasgow. Sir Alexander Roger, chairman, B.I.C.C., was unable to be present and Mr. P. V. Hunter, deputy chairman, presided; several directors of both companies were also present. Mr. G. Bourne replied to the chairman's address on behalf of all staff present.

OBITUARY

Mr. S. C. Bunn.—The death occurred on 5th November at the age of fifty of Mr. Sidney Charles Bunn, M.I.E.E., M.I.Mech.E., F.Inst.F., assistant electrical engineer at the Lots Road generating station of the London Transport Executive. Mr. Bunn was educated at the East London College of Engineering and after experience in marine engineering, erection and testing engineering and boiler manufacture, he was appointed boiler house engineer at Lots Road generating station, which was then owned by the London Electric Railway Co., in 1921. From 1930 to 1935 he was resident engineer at Lots Road station and became assistant electrical engineer in 1940.

Mr. A. W. Pannell.—The death occurred on 2nd November of Mr. A. W. Pannell, director of Edstone, Ltd., and who was for many years export manager of the Plessey Co., Ltd.

Mr. Charles Gandy, chairman of the National Smoke Abatement Society, died at his home in Bowdon, Cheshire, on 4th November.

Mr. Charles Ernest Vines, managing director of the Advance Lamp Co., Ltd., electrical wholesalers, Hamilton Square, Birkenhead, has died in hospital after a short illness.

WILLS

Lt.-Col. F. W. Bancroft, T.D., R.A., of the staff of the South Western Electricity Board, who died on 16th July last, left £1,665 gross (£1,624 net).

Mr. F. E. Denne, mains engineer with the Brighton and Hove District of the South Eastern Electricity Board, who died on 23rd August last, left £3,193 gross (£2,545 net).

Mr. A. C. Baker, C.B.E., general manager of Birmingham Corporation's Transport Department since 1928, who died on 22nd July last, left £16,146 gross (£15,982 net).

North Wales Bill

THE Bill which the B.E.A. is to promote for the purpose of carrying out hydro-electric schemes in North and Mid Wales is not likely to be introduced into Parliament before next autumn. Until all the necessary technical information is obtained the promoters cannot decide whether the Bill should contain all the six proposed new schemes in addition to extensions at Dolgarrog and Maentwrog.

Anglo-Danish Cable

Installation of Telegraph Equipment

THE first coaxial submarine cable devoted exclusively to voice-frequency telegraph circuits was recently put into service by the Great Northern Telegraph Company of Denmark. The laying of the submarine cable between Weybourne in Norfolk and Fanöe Island near Esbjerg has been described (*Electrical Review*, 21st July, 1950) and telegraph equipment has now been installed in London, Copenhagen, Esbjerg and at the submarine cable terminals; nine traffic circuits have been put into service. The cable was manufactured by Submarine Cables, Ltd., which is jointly owned by Siemens Bros. & Co., Ltd., and the Telegraph Construction & Maintenance Co., Ltd.; the telegraph equipment was manufactured by Siemens Bros. & Co., Ltd.

The equipment operates on the voice-frequency principle, whereby the telegraph signals in each channel modulate an audio-frequency tone and all such tones are sent simultaneously over the cable. At the receiving end electrical filters separate the incoming tones and amplifier detectors associated with each individual tone provide d.c. signals to the telegraph receiving apparatus.

The British telegraph terminal is in the Great Northern Telegraph Co.'s offices in London and the Danish terminal in the Post Office main station in Copenhagen. Between London and the cable station at Weybourne, and between Esbjerg and Copenhagen, the circuits are carried through the inland network of the respective telephone and telegraph administrations. The telegraph repeating and amplifying equipment installed in the cable station provides the group modulating and translating facilities for sending all circuits in one direction in one band of frequencies and circuits in the opposite direction in a higher band of frequencies, which are necessarily not the same as those sent through the inland networks.

A special tie cable connects Esbjerg repeater station with the cable terminal hut at Fanöe. It not only carries the telegraph traffic in both directions, but also supplies 50 c/s a.c. for the equipment at Fanöe and additional wires which provide for automatic regulation and control from Esbjerg of the equipment installed at Fanöe, which station is normally unattended. The telegraph equipment is of recent design and all circuits meet the latest C.C.I.T. requirements for international telegraphy.

Noise measurements made on the completed installation have shown that the precautions taken in cable construction, choice of landing point and installation arrangements have secured a very effective reduction of external interference and it is anticipated that up to 24 circuits can be worked over the present system. At a later date the number of circuits will be further increased by the addition of submerged repeater equipment in the cable.

With the putting into service of these additional facilities "Telex" telegraph traffic between Great Britain and Scandinavia will be greatly facilitated.

STREET LIGHTING TO AVERT ACCIDENT

MR. J. M. Waldram, London, told the annual conference of the Scottish section of the Association of Public Lighting Engineers in Aberdeen recently that well-planned street lighting could go a long way towards preventing street accidents. Nobody could count accidents that did not happen, and nobody could evaluate the virtues of good lighting. He appealed to road engineers not to make road surfaces so rough and dark as this lessened the value of lighting.

Mr. P. Richbell, London, national president, referred to the large number of monstrosities used as public lighting equipment one could see when travelling through the country. All concerned ought to take every opportunity of removing them, he said.

Mr. R. Parker, superintendent of lighting, Aberdeen, chairman, suggested that a diploma of public lighting should be established that would command the respect of local authorities and their officers. Successful launching of a diploma would enhance the prestige of the Association and would raise its status. It would be of great value also if they were to seek to obtain a royal charter.

VIEWS on the NEWS

By REFLECTOR

THE distribution of £5 million among the local authorities who were owners of undertakings acquired by the British Electricity Authority seems to have raised anew the cry of "confiscation." Many Councils (and the local newspapers) persist in regarding the amounts as in some sense payment for the undertakings and complain of the inadequacy of the sums they are receiving. Actually the payments, made under Section 23 of the 1947 Electricity Act, are compensation in respect of "severance" which, roughly speaking, seems to mean losses incurred by the local authorities because of the taking over of their undertakings but that does not include such items as the amounts which were formerly taken by some local authorities as rate relief. This was merely a tax on electricity consumers and, as I have always maintained, was quite unjustifiable.

* * *

I referred about a month ago to the very direct retort which Lord Citrine made to the Lord Mayor of Birmingham who, during a luncheon at which Lord Citrine was a guest, rather unfairly criticized the B.E.A. and Electricity Boards. The matter was raised at a meeting of the Birmingham City Council when the Lord Mayor said that he was only voicing the irritation of industrialists and workers at electricity cuts. Alderman W. S. Lewis, who happens to be chairman of the Midlands Electricity Board, as well as a former Lord Mayor, deprecated the present Lord Mayor's attitude and went on to show that really remarkable results had been achieved by the electricity supply authorities in the face of the adverse conditions with which they have had to contend. The Lord Mayor remained unrepentant, however, and said that the authorities should know how people feel about these things.

* * *

One of the most difficult of overseas markets for electrical plant is Tibet. In the past I remember hearing of generating sets and other heavy equipment having to be borne in small portions over the mountains to Lhasa. The method of transport through the Himalayan passes is the yak, which is more susceptible to the last straw than the camel. Another drawback has been the reluctance of the Tibetans to admit strangers into their country, leading to a desire to do much of the erection work themselves under the supervision of as few outsiders as possible. This subject has been brought to mind again by some notes in the *Manchester Evening News* on the holding-up of the dispatch of water-turbine plant from this country by recent events in Tibet.

* * *

A member of one of the Electricity Consultative Councils recently said in a public speech that the Councils should have the right to appeal to a higher authority than the "State Boards" when their suggestions were not adopted. He should know that the Councils have such a right. They can appeal against decisions of their Boards to the British Electricity Authority (as the Eastern Council did recently) and then if necessary (under Section 7 (8) of the 1947 Electricity Act) to the Minister of Fuel and Power. It may be considered that the Minister is not entirely an impartial judge but the only alternative seems to be a separate tribunal and surely there are enough of these quasi-judicial bodies already.

* * *

The *Evening Standard* says that it is the "proud boast" of the French Government that there is no need for cuts and dim-outs this winter and contrasts this with the state of the British electricity supply system. The happy state in France is entirely due to Nature; the reservoirs of the hydro-electric undertakings are full. France, in previous years, has experienced cuts on a scale quite unknown here and is likely to have a repetition of her troubles whenever the water reserves fall short. I realize, of course, that Nature may take a hand in our affairs this winter but things are not likely to be so bad as they have been in France.

Electrical Power Engineers

Minister of Fuel at Annual Dinner

NEARLY 400 members and guests of the Electrical Power Engineers' Association attended the twenty-third annual dinner given last Friday to the National Executive Council by the South-Eastern Division with Mr. L. V. Mountfort in the chair.

Proposing the toast of "The Association," the Minister of Fuel and Power (Mr. P. Noel-Baker) recalled its valuable aid in drafting the 1947 Act and referred to Lord Citrine's interest in education and training as manifested by the "technical schools" of the B.E.A. Electricity, he said, was not the only commodity of which supply was not equal to demand and other countries suffered similarly. Even in the United States "brown outs" plagued some sections of the country. Load shedding was to be expected for at least the next two years, the extent depending on the weather. Dark clouds could cause an immediate increase in demand of 300 MW.

Rapid Expansion

In 1949 the total consumption of electricity in Great Britain was double and the demand 80 per cent more compared with 1938; domestic consumption was 2½ times as great. Since 1947 the latter had increased by 6 per cent and industrial consumption by 19 per cent. A quarter of the power now came from plant above 25 years old. This year 950 MW would be installed—far more than in any pre-war year. Electric fires could well be used to save coal against real winter, but not, if possible, during the three peak hours.

In the United States 6 kWh was used per worker as against 2 in this country—a measure of the progress needed here. New sources of power such as wind would have to be tapped. In France 25 per cent of thermal power was obtained from "unsaleable" coal.

Responding, Mr. W. Ingledew (president, E.P.E.A.) quoted the objects of the Association laid down thirty-one years ago. These embraced not only the protection of its members' legitimate interests but also expressed a broad-minded view of the welfare of the industry. The success of the E.P.E.A. depended upon a realization by its members that they were not in it merely for what they could get out of it and that one could get out of it only what was put in. He contended that as electricity supply was primarily an engineering industry, engineers with administrative ability should predominate in management. Technical men should contribute at all levels to the efficient working of the joint advisory machinery.

Sir Archibald Gill (president, I.E.E.), proposing the toast of "The Electricity Supply Industry," commended the recently published report of the Anglo-American Productivity Council. The team of all grades which visited the United States included Mr. J. F. Wallace, general secretary of the E.P.E.A.

Press and the Industry

Lord Citrine (chairman, B.E.A.), responding, claimed that a fair measure of success had been achieved in the 2½ years since vesting date—years which had seen a phenomenal expansion of demand and also of generating plant—but present manufacturing resources were not enough to make up leeway due to the war. Broadly speaking the Press, and prominently the technical Press, had treated the industry with fairness. There could be no objection to criticism so long as critics took the trouble to discover easily ascertainable facts. Sometimes, however, ill-informed attacks had been made on the B.E.A. whose reasoned replies had not been published. The public was entitled to hear both sides. Lord Citrine thanked the Association for its statesmanlike restraint when numerous claims were being made soon after vesting date. Three electricity supply delegations had visited the United States besides the one arranged by the Anglo-American Council on Productivity.

Their reports had shown that technical skill in Britain was as high as anywhere, though it did not enjoy the same opportunities. With Sir John Hacking, an engineer of great administrative ability, as deputy chairman of the B.E.A., there was no doubt that when conditions became more favourable British electricity supply could be the most successful in the world.

Before the subsequent dancing started the chairman thanked Mr. F. H. Smethurst, who has organized these functions since 1931.

E.I.B.A. Ball

An Enjoyable and Successful Evening

OVER 950 tickets were sold for the annual ball of the Electrical Industries Benevolent Association on Friday last. As usual, the gathering was the most representative of the electrical profession and industry of all the electrical functions. This year the main hall of Grosvenor House, London, W.C.2, was secured and so the large company had much more space at their disposal than has been the case at the other post-war E.I.B.A. balls.

The guests were received by the president (Mr. E. C. Holroyde) and Mrs. Holroyde and during an interval Mr. Holroyde commended the objects of the Association to those present and called for their utmost support. He also read a telegram that had been sent to the Association's patron, the King, and His Majesty's reply. At another juncture Mr. L. C. Sharp, chairman of the Court, made a brief speech in which he was able to announce that the proceeds of the evening

(1) The President (Mr. E. C. Holroyde) and Mrs. Holroyde. (2) The President's table: standing, Messrs. H. S. Fothergill (secretary), H. A. Deacon and L. C. Sharp (chairman of Court). (3) The G.E.C. table (Mr. M. R. Neville in right-hand foreground). (4) Mr. S. C. Hurry's party, including Mr. S. F. Steward. (5) Sir John Dalton's table

had reached £1,200, including £328 received from the sale of programmes. He expressed the Association's thanks to the British Thomson-Houston Co., Ltd., which had provided the programmes and the ladies who so successfully sold them.

Once again a number of electrical concerns gave a variety of handsome prizes (about

(6) Group including Sir John and Lady Hacking, Mr. Harold Hobson, Mr. H. Cobden-Turner and Mr. E. B. Preston

(7) Mr. H. A. Deacon's party

(8) Some electrical wholesalers, including Mr. and Mrs. J. M. Hollander and Mr. A. B. Wildsmith

(9) Mr. L. C. Sharp and his guests

(10) Messrs. W. J. Jones and C. A. Hughes are the hosts at this table

forty) and this added greatly to the interest of the evening. Music for the dancing was provided by Sidney Lipton's Ballroom Orchestra and the cabaret artistes were Roger Smith and his "talking guitar" (an interesting application of electronics), "Moskani" and Norman Wisdom. The majority of the guests remained until the party broke up at 2 a.m., a sufficient testimonial to the success of the arrangements carried out by the secretary, Mr. H Senior Fothergill and his staff.

Advice for Contractors

THE director and secretary of the Electrical Contractors' Association (Mr. L. C. Penwill) has circulated to his members advice on a number of points prepared by the Association's Technical Committee.

Among the subjects dealt with are ring circuits on d.c. mains. The Committee says that when I.E.E. Regulation 201 (C) was drafted the fact that it might apply to d.c. circuits was not considered as it was assumed that all the new houses would be fed from a general a.c. supply. The specification for the fused plug and socket-outlet was considered in the same light. It appears, however, that the assumption that ring circuits would be utilized only in a.c. areas was incorrect as cases have occurred in which they are required on d.c. supplies. In view of the fact that amendments have now been made to the specification for the fused plug and socket (B.S. 1363) which, in turn, affect the application of I.E.E. Regulation 201 (C), the Committee reviews the situation as it stands at the moment.

Regulation 201 (C) covers the use of more than one fused plug and socket on circuits rated at more than 15 A but its provisions are not necessarily restricted to a.c. circuits. Exemptions (ii) and (iii) of the regulation, however, specify that the socket-outlets concerned must be of the 13 A variety and Regulation 1312 states that fused plugs and socket-outlets must comply with B.S. 1363. Originally this Standard was issued without restriction on the use of the plugs and socket-outlets it described, but an amendment has now been issued restricting their use to a.c. circuits up to 250 V, accompanied by a warning that they are not intended for use on d.c. circuits. (It is understood that the clearances laid down in the Standard are not regarded as sufficient for d.c. circuits.)

Thus this restriction of B.S. 1363 fused plugs and sockets to a.c. circuits likewise restricts the installation of ring circuits to a.c. supplies. It is understood that consideration is being given to an amendment to the specification to cover socket-outlets and plugs suitable for d.c. circuits.

Jointing Aluminium Conduit

It has been found from experience that when aluminium conduit and zinc alloy fittings are used, the risk of the increase of resistance of screwed joints can be practically eliminated provided that the threads are protected and that the joints are quite tight. Protection of these threads may be achieved as follows:—Screwed threads on fittings should be dipped in some protective compound immediately after screwing by the manufacturer; and threads of conduit should be screwed under lubricant and smeared with petroleum jelly immediately thereafter on site.

Electric Blowers for Church Organs

It has been brought to the attention of the Technical Committee that from time to time the Home Office receives reports from fire brigades showing that fires are caused by failures (usually overheating) of small blower motors used for church organs. There are various reasons such as faults which are not cleared by circuit fuses, contactors which stick, or where a bellows-operated control switch fails to operate. It is suggested that some form of thermal protection might be adopted as is commonly the case for industrial and other purposes. Particulars of suitable devices can be obtained from the E.C.A. head office.

Shoddy Apparatus

Attention is drawn to the Advisory Committee on Electrical Appliances and Accessories which is now a well established organization for the examination and approval of appliances. Members of the E.C.A. are urged to make every use of the Advisory Committee by supplying to the Association's Technical Committee examples of apparatus which they regard as of shoddy construction and liable to prove dangerous.

Railway Signalling Relays

AS part of a general revision of the British Standards for relays for railway signalling a revised edition has been published of B.S.519 "Tractive Armature D.C. Neutral-Polar Line Relays for Railway Signalling." B.S.1659 has also been published as a combined revision of B.S.452 "Tractive Armature D.C. Neutral Track Relays" and B.S.475 "Tractive Armature D.C. Neutral Line Relays." These publications are available from the British Standards Institution, 24, Victoria Street, London, S.W.1., price 2s 6d each, post free.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Provision for Depreciation

IT was very kind of you to give so much prominence to my address as chairman of the I.E.E. South Midlands Centre, but I think perhaps it was justified as, in my view, under the reorganized electricity supply industry it is more than ever necessary to ensure that the engineer studies beforehand the probable financial effect of his intended action, and it is equally important afterwards to examine the financial results of his action to assist him to make the right decisions in future. He should study the past to shape the future.

I did not attempt to give a complete review of the electricity supply industry, but to apply the "money yardstick" to some controversial subjects to provoke discussion of them, and your necessarily brief review picks out one or two of these.

There is, however, one error in your review which I think should be corrected. You attribute to me the view that "Sufficient provision did not appear to have been made for depreciation in the past," whereas I said in my address, after referring to the amount of capital expenditure outstanding, that "Since half of the £900 million was less than 15 years old, and less than one-tenth was over 30 years old, it does appear that there has been ample provision in the past for depreciation."

D. H. KENDON,
Deputy Chairman,
Midlands Electricity Board

Halesowen.

Bactericidal U.V. Rays

IN your issue of 6th October you mentioned the reluctance of the American Medical Association to "accept" ultra-violet radiation from lamps as a means of disinfecting air.

May we point out that the American Medical Association has never shown any "reluctance" to accept the use of bactericidal rays. Its Council of Physical Therapy published its first "Acceptance of U.V. Lamps for Disinfecting Purposes" on 24th January, 1942 (*Jour. A.M.A.*, page 298). In a further statement, published 11th September, 1943, it writes "clinical evidence submitted to the Council on Physical Therapy shows that under properly controlled conditions the killing of air-borne micro-organisms by ultra-violet rays may be used to supplement other methods of disinfecting air for prevention of cross infection in contagious wards, in nurseries and for reducing air-borne infection of wounds in hospital operating rooms." Again, on 28th August, 1948 (*Jour. A.M.A.*, page 1603), it writes "the Council on Physical Medicine has decided to continue its previously announced policy of accepting ultra-violet lamps, as an adjuvant, for disinfecting air in hospitals, nurseries and operating rooms (relatively free from dust) as practised by present-day empiric methods."

The Council has withheld recognition of certain untested claims by American manufacturers, but as our extracts may show, they have fully "accepted" the value of bactericidal low-pressure mercury discharge lamps as a means of disinfecting air.

HANOVIA, LTD.
D. A. JONES, *Director*.

Slough.

From Sir Claude Gibb

Parsons Plant for Ontario

THE information published in the *Daily Dispatch*, Manchester (*Electrical Review*, 10th November) was incorrect on the date of publication, but has been made correct only this morning (9th November) by the further order from the Ontario Hydro-Electric Power Commission. It is incorrect as regards total cost.

This company is at present completing two 100,000 kW turbo-alternators, the first being a dual-frequency unit, i.e., initial operation at 25 c/s and 1,500 r.p.m., subsequently changing to 60 c/s at 1,800 r.p.m. The second unit is to be a straight 60 c/s, 1,800 r.p.m., 100,000 kW turbo-alternator.

The third order, placed last week, is for a duplicate of the second, or 60-cycle, unit, whilst the fourth order received this morning is for a duplicate of the first, or dual-frequency, unit. The total value of the orders for the third and fourth units at present-day rates of exchange is rather over $4,000,000.

CLAUDE GIBB,
Chairman, C. A. Parsons & Co., Ltd.

Newcastle-on-Tyne, 6.

Higher Technological Education

Report Suggests Royal College

THERE is an urgent need for a wide development of technological education in this country if Britain is to maintain its place as a leading industrial nation. This is the view of the National Advisory Council on Education for Industry and Commerce whose first report, "The Future Development of Higher Technological Education," has been published this week by H.M. Stationery Office, price 1s net.

The main recommendations of the Council are the establishment or development of courses of a high standard in technology; the creation of new awards of degree standard; and the establishment of a Royal College of Technologists to approve such courses and confer the awards.

The Council was set up in 1948 by Mr. George Tomlinson, the Minister of Education, under the chairmanship of Lieut.-Gen. Sir Ronald M. Weeks, to advise him on all matters concerned with the education for industry and commerce, and this report suggests how higher technological education should be developed in this country. The main task was to suggest how the contribution of the technical colleges could be improved and expanded to meet the needs of industry and those of the individual student. The views of 145 different bodies have been considered and in a foreword to the Report the Minister states that before taking any decision on the recommendations he will consider any comments made.

In addition to the chairman, the Council consists of fifty-two representatives of local education authorities, universities, teachers, employers, employees and a further 20 members nominated by the Minister.

At present, both universities and technical colleges are concerned with the training of technologists, the technical colleges dealing more with students coming direct from industry. The Council agrees that the universities have a specific function to perform in the development of technological education and that their work should be more closely related to fundamental science than that of the technical colleges, their courses, in general, containing a smaller amount of training related to immediate or special work in industry.

The contribution of the technical colleges is already considerable. In 1948, 7,100 students were taking full-time courses of a degree standard with a further 9,784 taking part-time courses. The Council considers that, given a radical improvement in finance, equipment, staffing and accommodation, these colleges could and should provide more high-level courses of a degree standard and courses for post-graduate work. They also feel that a suitable award is necessary to encourage students to undertake these advanced courses and recommend an "Associateship" of the suggested Royal College as the first award, "Membership" for the second award, and "Fellowships" and "Honorary Fellowships" for those who further distinguish themselves in technological education and research.

It is recommended that the Royal College should consist of a Court, assisted by a Council and an Academic Board. The Court would consist of 16 persons of eminence in the field of technology nominated by the Crown, four representatives of the Council and four of the Academic Board. The Council would include persons nominated by universities, technical colleges, employers, employees in industry, professional institutions and local education authorities, while the Academic Board would include persons from the teaching staffs of technical colleges and universities and persons experienced in educational matters chosen from among professional institutions and industry.

COLOUR-LIGHT SIGNALLING

IN the areas Battersea Park and Coulsdon North on the Victoria–Brighton lines and Bricklayers' Arms Junction to Croydon on the London Bridge–Brighton lines, the mechanical signalling combined with Sykes Lock and Block, which has given good service for over 40 years, was found to be in need of replacement. Increased train services also necessitated an increase in track capacity so it was decided in 1946 to replace the existing signalling by colour light signalling to link up with existing installations and provide continuous colour light signalling from Victoria and London Bridge to Brighton.

This work which will cost nearly £1¾ million will include the provision of 11 new all-electric signal boxes and is being spread over six years; the first of four stages, that from Bricklayers' Arms Junction to Norwood Junction North was recently brought into use.

Stage II, from Battersea Park to Selhurst, is planned to be brought into service in 1952; Stage III, Norwood Junction and Gloucester Road Junction, which will provide the link between Stages I and II, in 1954, and Stage IV from East Croydon to Coulsdon North in 1955. The whole area covers 98 track miles of colour-light signalling with continuous track circuiting.

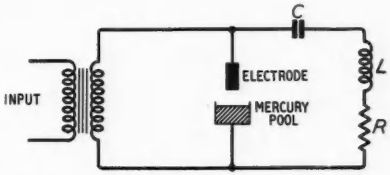
High-Frequency Melting

Laboratory Heat Treatment Equipment

A NEWLY designed spark gap generator that has become available for use in research organizations, production laboratories and teaching establishments is described as a 6 kW set, although both 3 kW and 20 kW equipments have also been designed. The equipment is housed in a sheet steel cabinet with a 3ft 6in high worktable behind which all the controls are conveniently grouped. A range of crucibles and heating coils can be supplied, designed for rapid interchangeability. The whole set, with the exception of the incoming a.c. and cooling water, is completely self-contained and can be mounted on castors, if desired, for manœuvrability in educational institutions to enable a melting or heating demonstration to be set up in a laboratory or class-room by simply wheeling in the set, plugging it into the mains and connecting the water inlet to a tap and the drain to a sink. The 6 kW unit measures 3ft by 3ft 6in by 4ft 6in high.

The equipment is essentially a resonant oscillatory circuit, composed of an inductance and capacitance in parallel, intermittently completed by a mercury spark gap. The inductance is the heating coil L (around the crucible, or open for heat treatment uses) while the capacitance C is in the form of high voltage heavy duty condensers mounted in racks in the cubicle. A special oil-immersed single-phase transformer steps up the mains voltage to 6,000 V ; it has a high leakage reactance, so that when the spark occurs the effectively short circuited transformer will not pass a heavy current and the main current across the gap is at the resonant frequency. The spark gap is surrounded by hydrogen ; this is necessary both to assist in dissipating the heat from the spark in conjunction with water jacketing of the spark chamber and also to prevent oxidation and deterioration of the mercury. The copper electrode is water cooled and is suspended

High-frequency 6 kW melting cubicle for laboratory and educational uses



Diagrammatic representation of spark gap circuit

TABLE I.—MELTING PERFORMANCES

Metal	Weight of charge	Approx. melting time (min)		
		3 kW	6 kW	20 kW
Steel	1 lb	15	8	—
	2 lb	35	18	—
	3 lb	—	50	10
	5 lb	—	—	13
	12 lb	—	—	35
Platinum	20 oz troy	45	20	—
	40 oz ,,	—	45	—
	100 oz ,,	—	—	15
Copper	2 lb	20	8	—
	5 lb	—	23	5
	12 lb	—	—	12

above the pool of mercury, which can be tilted in relation to the electrode; this varies the length of the gap and gives a measure of power control, since the voltage to which the capacitors charge before the arc is made depends upon the gap length. The whole spark gap chamber is also water cooled.

When the arc strikes, the capacitor and coil circuit is set into oscillation at the resonant frequency of around 50 kc/s by the sudden discharge of current from the capacitors; the train of oscillations is damped by the resistance R of the circuit, which includes the effective resistance of the loaded work coil. The spark ceases as soon as the capacity voltage falls below a value which will sustain it and the process of charging is repeated until the gap sparks over again. This may occur several times in every half cycle of mains frequency. The wider the gap, the greater is the power generated, since the initial discharge current, and thus the magnitude of the oscillations, will be greater.

It will be appreciated that the output from the set will fluctuate according to the number of times per cycle that the spark occurs. The equipment is not, therefore, suitable for applications in which very accurate control of heat input is necessary, such as surface hardening; but for melting, annealing, through heating of forgings and deep case hardening this type of plant is a cheap and most convenient source of high-frequency energy.

The cubicle contains a recess at the rear in which a hydrogen cylinder can be clamped. A reducing valve and pressure gauge are included on the main control panel to operate in conjunction with the hydrogen bottle while a bubble jar behind a glass window in the centre of the control panel gives a clear indication of the quantity of gas that is being supplied to the spark gap chamber.

A meter indicating mean kW input from the mains is mounted alongside the power control knob, its reading indicating approximately twice the power actually delivered to the work. The cooling water from the spark gap chamber and electrode passes to waste through a flow bucket relay connected in the energizing circuit for the "power on" contactor. This ensures that damage cannot be done to the set by inadvertent application of high frequency power when the cooling water is not flowing.

The plant has been introduced by Birlec, Ltd. It is fully protected by fuses, has been designed for easy operation by unskilled people, will develop its full power immediately after switching on and can be adjusted for a mean output down to about $\frac{1}{6}$ of the full value.

A 6 kW set has recently been installed in the Research Department of the Birmingham Small Arms Co., Ltd., where it will be used for general experimental purposes, particularly brazing.

Resistance Welding Research

Association's New Equipment

AT its engineering and resistance welding research laboratories at Abingdon Hall, nr. Cambridge, the British Welding Research Association recently held three "open days" in order that interested persons might learn something of the Association's activities at first hand.

The resistance welding research department has developed rapidly during the last two years with the provision of welding equipment and testing facilities. The machines now available are a 100 kVA projection welder, a 25 kVA spot welder, and two condenser discharge spot welding machines.

The X-ray laboratory has been equipped with a useful range of Seifert equipment through the kindness of the Admiralty. Three tube head assemblies are available, a 150 kV fine focus tube for thin light alloy sections and the radiography of spot welds in light alloys, a 150 kV long anode tube and a 250 kV tube for heavy steel sections. A small metallurgical laboratory has also been established and this provides facilities for metallographic examination, hardness and tensile testing.

The main work of the department is broadly divided into two groups, i.e. work on light alloys and work on low carbon steels. The researches in hand are characterized by two important features; the use of statistical methods in the planning of experiments and interpretation of results, and the extensive instrumentation of the welding machines for the measurement of the important welding variables of secondary current and electrode load cycle.

Industry and the House

A New Session Begins

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

THE opening of the new session of Parliament found Members of the House of Commons already getting accustomed to their new Chamber. It was used for the first time on the last day of the previous session, and then only for a short while. The long debate on the King's Speech was the first full-length occasion on which the new Chamber has been used. The comments of M.P.s are free and very mixed, but most are delighted with the new accommodation. It is certainly much better than anything the Commons have had before.

The main criticisms centre around lighting, voice amplification, and ventilation. The Chamber is lit through translucent panels in the ceiling. A soft, almost ghostly light is shed on the Members, and while the illumination is excellent to read by there is a sense of flatness due to the lack of shadows. Acoustical arrangements were bound to be a difficult problem : how to amplify without overdoing it. The Speaker has boldly announced that there will be experiments until the best form of control is found. This means that on some days amplification will be confined to the galleries only, while on others it will be extended to the whole of the Chamber.

An elaborate system of ventilation provides greatly improved conditions, but unexpected draughts appear from nowhere. Thus the Speaker has had to sit with a rug over his knees, and Mr. Churchill went out on one occasion only to return in an overcoat buttoned up to the chin. In actual fact ventilation, acoustics and, to a lesser extent, lighting are extremely complex problems in a Chamber of this type. Those concerned have done the Commons well.

King's Speech

The King's Speech contained few surprises. With the two major parties so evenly balanced the Government doubtless thought that controversial legislation would be imprudent. The only nationalization measure is a proposal to take over the British Sugar Beet Corporation which has always been subsidized by the Government. The much larger cane sugar refining industry is untouched and none of the " threatened " industries, such as cement, insurance and chemicals, have been mentioned.

This is not to say that the Government does not possess great administrative powers already. The actual nationalization of iron and steel will be proceeded with during this session without the necessity of the Government coming to Parliament for any further powers. It will be for the Opposition to stage a motion of censure on this subject at the appropriate time.

Continuation of Controls

Nevertheless the Labour Government is going to seek power to make permanent various wartime controls over industry and the public which it has exercised ever since on a yearly basis. If Dr. Dalton's winding-up speech is an accurate indication, this action will lead to sharp controversy. The Government has not been very specific as to the controls which it wishes to make permanent, but it is fair to assume that they will include control of prices, of imports and exports, of capital investment, and building. Direction of labour is dead.

This session will see a further restoration of the rights of private Members who will now be able to present their own Bills under the " Ten-minute Rule." A number of useful little Acts have become law in this way.

Mr. Noel-Baker, Minister of Fuel and Power, has come in for some heavy criticism at question time on the subject of the British Electricity Authority's advertising programme. The advertising programmes of the nationalized undertakings are usually regarded by the Table as matters of day to day management and therefore not an appropriate subject for Parliamentary questions. Major Beamish, therefore, made his attack in a supplementary question, and was followed by Mr. John Boyd Carpenter who

extracted the surprising invitation from the Minister to put a question down on the order paper about this very subject. This seemed to open the way to subjecting these industries to rather closer Parliamentary scrutiny than has been possible so far. Unfortunately when Mr. Boyd Carpenter put the question on Monday the Minister considered it a matter of day to day administration on which it would not be desirable to comment.

Members are receiving numerous complaints from constituents about power cuts. There is no doubt that the B.E.A. is fully alive to the importance of maintaining good relationship with M.P.s. A Member's letter is promptly dealt with and very fully answered. If the Member cares to give the name and address of the constituent an official calls soon after to explain the system of cuts and to deal with any other matters at the same time. Naturally everyone would rather have a full supply than a lot of explanation—but explanations do help, and I know from experience with my own constituents that the result is often to secure the co-operation of consumers at the times of peak load.

The Parliamentary and Scientific Committee held a discussion at Westminster last week on productivity at which the speakers were Sir Geoffrey Heyworth, chairman of Unilevers, Sir Charles Colston, the head of Hoover, Ltd., Sir Thomas Hutton, of the Anglo-American Productivity Council, and Mr. Lincoln Evans, the general secretary of the Iron and Steel Trades Confederation. So many useful ideas emerged that the Committee hopes to print what was said in full for wide general distribution.

Parliamentary News

BY OUR SPECIAL REPORTER

REPLYING to Sir Herbert Williams in the House of Commons last week the Minister of Fuel and Power, Mr. Noel-Baker, said he was informed by the British Electricity Authority that the proportion of generating plant out of operation on 31st October because of overhaul was 12·2 per cent.

Sir Herbert Williams asked why a paragraph in the evening papers stated that the proportion was 20 per cent. Was the Minister aware that in a great many cases the overhaul commenced late in July instead of early in June?

Mr. Noel-Baker replied that the overhaul had to be made throughout the year. In addition, there was some capacity out of use owing to a breakdown. They had to keep in continuous use a great deal of old plant which before the war would have been replaced.

Copper and Steel

Mr. John Grimston asked the Minister of Supply if he was aware of the sudden demand for copper from unusual export markets; and what steps he was taking to keep the metal in the country for the use of our finishing industries.

Mr. George Strauss said that the answer to the first part of the question was "Yes." The export of copper and copper scrap, except under licence, was prohibited. Licences were granted exceptionally for the export of very small quantities of unwrought copper. Exports, under licence, of copper alloys in ingot form were restricted, by arrangement with the trade, to a quota based on exports in 1949. Since 11th September, 1950, exports of semi-manufactures of copper, except under licence, had also been prohibited. Licences were granted for exports to traditional markets, notably the Commonwealth countries. But the extent of these exports was now being reviewed.

Lt.-Col. Lipton asked the Minister of Supply what steps were being taken to ensure fair allocations to industrial users of rolled steel production.

Mr. Strauss said that all steel, other than sheets and tinplate, was freed from distribution control last May and no allocation to industrial users was now made. Extensive additional buying, following the outbreak of war in Korea and the announcement of the Government's rearmament programme, was causing delay in obtaining supplies.

African Hydro-Electric Development

During a House of Commons debate on Colonial development last week, Mr. Lennox-Boyd spoke of the production of raw materials in the African territories and the development of secondary processes. He said that between Lake Victoria and where the Nile entered the Sudan there was hydro-electric power available equivalent to the total output of this country in 1937. When that was tapped over a considerable period there would be an enormous

quantity of cheap electricity. He was thinking not in terms of five or ten, but 50 years ahead. We must seek to attract certain types of production to that part of the world, and further south, on the Zambesi—we might process iron ore, using hydro-electric power, and then we could export semi-finished materials.

Television Stations

Replying to questions, the Postmaster-General said that building of the Scottish television station had already commenced and the B.B.C. hoped that the station would be brought into service by about the end of 1951.

Until they had had experience of the high-power station near Cardiff it was not certain what areas of West Wales would be unable to receive the service. The question would be carefully considered in the light of that experience. There had been local objections to the use of the site originally selected for the Cardiff station at St. Nicholas, Glamorgan, and the B.B.C. was negotiating for the use of an alternative site about a mile away.

Amateur Transmissions

Mr. C. I. Orr-Ewing asked the Postmaster-General why he had not permitted amateur television in the 420–430 Mc/s band as used by American and Dutch amateurs, and why he had not permitted operations in the 1,215–1,300 Mc/s band which was reserved exclusively for amateur operation by international agreement.

Mr. Ness Edwards said that band 420–460 Mc/s was recognized internationally as primarily for the use of aeronautical radio-navigational services and the band 1,215–1,300 Mc/s was needed to meet certain national defence requirements.

Frequency Modulation

Replying to Mr. William Shepherd, Mr. Ness Edwards said that as part of its general research effort, the B.B.C. was investigating the relative merits of both frequency and amplitude modulated broadcasting on very high frequencies by experimental transmissions from the station at Wrotham. The current cost was about £20,000 a year. He was satisfied that broadcasting on these frequencies should be developed to relieve the congestion in the lower frequency bands, but he could not say whether amplitude or frequency modulation would be used until the experiments had been concluded.

Load Shedding

Mr. Osborne asked the Minister of Labour if he was aware of the serious dislocation in production and the loss of wages caused by the electricity power cuts; and, in view of the opposition of both sides of industry to working staggered hours, would be consult with industries in order to arrange work on Saturday mornings to reduce the abnormal load during peak hours.

Mr. Isaacs replied in the affirmative. He said that he regretted that load shedding had been necessary on a number of occasions in the last two months. The National Joint Advisory Council considered the matter at its meeting on 25th October and as a result, the Electricity Sub-Committee of the Council met on 7th November to examine the position. This meeting was attended by representatives of the B.E.A., the British Employers' Confederation, the T.U.C., Regional Boards and the Government Departments concerned. A further meeting was being held for a detailed examination of the problem.

WIND POWER CONFERENCE

UNTIL early this year each country interested in the possibilities of augmenting its coal and oil resources by utilizing wind power for the generation of electrical energy had independently pursued its own line of attack on the problems involved. During last spring, however, the Council of the Organization for European Economic Co-operation (O.E.E.C.) established a "Co-operative Research and Development Group (Wind Power)," comprising experts from member countries to collaborate in work on the subject. The group held its first meeting in Paris in April last, when it was decided that in each of the countries interested a particular organization should be designated to co-ordinate the studies. The British Electrical and Allied Industries Research Association is fulfilling this function in Great Britain.

The second meeting of the group was recently held in London and was attended by delegates from Austria, Belgium, Denmark, the Republic of Ireland, France, Germany, Greece and Holland, as well as from Great Britain and Northern Ireland, by representatives of Commonwealth countries, and by representatives of the Economic Co-operation Administration.

Under its president, Dr. D. Dresden (Holland), the conference discussed the technical and economic aspects of wind power as applied to the generation of electricity and compared experiences in the research and development work which is being undertaken. So as to avoid, so far as possible, duplication of the otherwise independent researches, plans have been formulated for exchanging information between the member countries.

This is one of several endeavours on the part of O.E.E.C. to encourage co-operation in research on a technical subject of general interest to member nations.

NEW BOOKS

The Protection of Transmission Systems against Lightning. By W. W. Lewis. Pp. 418; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 64s in U.K.

This book constitutes the first attempt to compress into one volume the knowledge collected during more than twenty years on a problem of overriding importance to transmission engineers. Starting from his own measurements, published in a well-known series of papers, the author draws predominantly on American information to present an account which starts with the mechanism of the lightning discharge and finishes with such specialized problems as the treatment of the system neutral or the protection of rotating machines.

It is a book written by an engineer for engineers and, while omitting almost all mathematics, it is heavily referenced and abounds in the description and graphical presentation of test results with an emphasis on test methods and instruments. Individual chapters deal with wave shapes and amplitudes of switching and lightning surges; shielding of overhead lines against direct strokes; earthing of transmission towers; insulation and spacing of conductors; and protective devices. Two appendices discuss the effect of altitude and humidity on insulator flashover, and the capacitance of transmission lines.

There is, however, a lack of co-ordination of the varied information given which, in some instances, is bound to puzzle the non-expert. The most important omission appears to be the absence of any reference to the behaviour of transformer windings under the impact of lightning surges; in fact, the term transformer does not even appear in the index. A feature, on the other hand, which will appeal to the practical engineer is the concise summary by which each chapter is rounded off.—R. H. G.

Arc Welder's Tables and Data. Edited by A. J. Coker. Pp. 144; figs. and index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 5s.

Particular attention has been given in this book to methods by which the highest speeds and economy can be achieved. Although primarily intended for everyday use by welding operators, the book will no doubt be of assistance to draughtsmen and production engineers who may have to decide on the most suitable process to be employed in any given case.—R. P.

Road Transport Law. By L. D. Kitchin, A.M.Inst.T. Revised by E. K. Wenlock. Pp. 126. Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 7s 6d (postage 4d).

This is the seventh edition of a standard work of reference among all concerned in the operation and manufacture of commercial and public service vehicles. It has been revised to bring it up to date, a new section is included on purchase tax, and the section on the Transport Act, 1947, has been extended to cover regulations relating to permits and compensation.

Etude Industrielle Général des Machines Electromagnetiques. By R. Langlois Berthelot. Pp. 300; figs. 121; index. Eyrolles Editeur, Paris.

This work is intended as an introduction to the subject for students, as well as a refresher for practising engineers and teachers. The first twenty-three pages are devoted to a discussion of teaching methods after which the author proceeds to a résumé of the properties of materials employed in electrical machines. Later sections of the book might form useful material for an advanced course in machine design. The next section deals with the measurement of machine properties, harmonic generation, and symmetrical components. The book closes with a discussion of the physical concept of reactive power.—G. M. E.

Books Received

How to Prevent Electrical Troubles. By E. B. Watton, A.M.I.E.E. Second Edition. Pp. 126; figs. 42. Percival Marshall & Co., Ltd., 23, Great Queen Street, London, W.C.2. Price 3s 6d.

Questions and Answers on A.C. Machines and Equipment. By E. Molloy. Pp. 135; figs. 91; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 5s.

Electrical Engineering Design Manual. By S. Parker Smith and M. G. Say. Second Edition. Pp. 259; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 16s.

Examples in Practical Mathematics (With Answers). By C. C. T. Baker, B.Sc. Pp. 186; figs. 41; index. English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 6s 6d.

Diesel-Electric Locomotive

For Branch Line and Local Train Services

A FEW days ago we went on the demonstration run of the new 827 h.p. mixed traffic diesel-electric locomotive, No. 10,800, which has recently been completed for British Railways at the Glasgow works of the North British Locomotive Co., Ltd. This locomotive, the first of its kind to be used in this country, is intended for secondary purposes, such as the operation of branch line and local train services, and will, together with the diesel-electric shunting and main line locomotives already in service, enable diesel traction to be investigated over the whole range of railway working.

It is of double-bogie design and has nose suspended traction motors mounted on each axle and driving through single reduction gearing. The general layout of the power equipment is similar to the standard 350 h.p. diesel-electric shunting locomotives but a carriage warming boiler is mounted in a separate compartment behind the driver's cab, and the main fuel tank is at the front of the locomotive with panel radiators on the bonnet sides, through which cooling air is drawn by a vertically disposed engine driven fan.

The power equipment comprises a Davey Paxman sixteen-cylinder engine rated at 827 b.h.p. at 1,250 r.p.m. coupled to a B.T.H. six-pole 800 kW generator with a continuous current rating of 1,600 A at 326 V. The auxiliary generator and exciter are mounted above the main machine and chain driven from an extension of the main generator armature shaft.

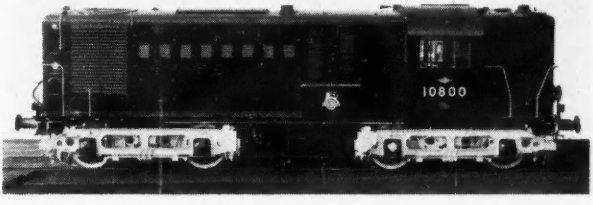
The main control gear is located in a cabinet immediately in front of the driver's cab, which can only be opened by the master switch key, which in turn can only be withdrawn when the main circuit is isolated. The cab has a central control desk with all controls duplicated to permit driving from either side. A vernier control is included for precise regulation of locomotive speed during hump shunting, or as required during normal operations. The control scheme allows for five engine speeds with load control provided to prevent overloading on all speeds except idling.

Compressed air is used for operation of certain contactors, the sanders, the horn and the refuelling equipment, but vacuum brakes are fitted, the associated "dead-man's pedal" being provided with a change-over cock to vary the action according to whether the locomotive is engaged in freight or passenger working.

The maximum design speed is 70 m.p.h., and the maximum tractive effort is 34,500 lb with a continuous rating of 18,800 lb at 12·3 m.p.h. Provision is made for propulsion starting of the main engine should the battery become discharged.

No. 10,800 has been completed to the design and requirements of Mr. H. G. Ivatt, chief mechanical engineer, London Midland Region, and is one of the projects sponsored by him and the former L.M.S. Railway Co. The mechanical structure was detailed by the North British Locomotive Co., Ltd., while the British Thomson-Houston Co., Ltd., was the main contractor for the power equipment of the locomotive.

A comprehensive series of trials is being planned in order to explore fully the possibilities of a locomotive of this type and power for the varied duties which could be allocated to it.



The 827 h.p. mixed traffic diesel-electric locomotive

Display Lighting

Trends in the United States

By A. H. OLSON, B.Sc., A.C.G.I., A.M.I.E.E.*

PROGRESS in lighting knowledge and technique is manifest in the high standard of recent installations which I saw during a recent visit to the United States. It is difficult to make a comparison between our two countries, owing to the building licensing restrictions over here, but where licences have been available, particularly in speciality shops, the installations compare very fairly. The availability of lighting materials recently developed and new lighting sources, are contributory factors in some of the differences.

As regards lighting sources, there is a far greater variety of tungsten lamps, a factor which affects the design of lighting fittings. The use of the silvered lamp in various sizes has resulted in numerous designs of semi-indirect fittings, whilst parabolic spots and flood lamps with special filaments and reflector contours, together with special lampholder bases affecting the length of the lamp, have been readily adopted by fitting manufacturers. Their task has been simplified, particularly in connection with swivel fittings, such as eye-balls, gimbals, and other units which have to be recessed in the ceiling.

It is surprising, with the load restrictions in this country, that the 75 W and the 100 W floods and spots have not been marketed by the lamp manufacturers. An interesting use of the higher wattage spots and floods, such as the 200 W and 300 W sizes, is now seen in stores with very high windows and interiors with a flood lamp recessed well into the fitting.

A pleasing development, more applicable to the domestic installation, has been the introduction of a bowl shaped internally frosted lamp, enamelled in a warm tint, with clear rings on the enamelling, and a clear circle at the bottom. This lamp requires no shielding and it is a step towards cheaper lighting for homes, whilst because of its surface brightness, the lamp is used more in a decorative way in commercial applications.

Hot Cathode Lamps

Important strides have been made in the hot cathode fluorescent lamp, particularly in colour and life. Manufacturers are now quoting 7,500 hours for standard lamps, approximately double the life of those put forward in this country. It is a very important development and the implications of this in considering the life of the cold cathode lamp, which is normally quoted at 10,000 hours, makes it fairly obvious that

* Managing Director, Courtney, Pope (Electrical), Ltd.

Women's wear store of R.H. Macy & Co., Jamaica, Long Island. (*Photo by Ben Schall, New York*)

the gap between the two is being narrowed.

The use of phosphor powders to correct deficiencies towards the red end of the spectrum has led to a new range of "de luxe" lamps appearing on the market; there are two colours available, the " cool " and the " warm white." These lamps have a lower surface brightness, together with a drop in efficiency of approximately 25 per cent; this drop may restrict the use of the lamp, except in installations where colour rendering is essential. While on this subject, it is interesting to note that American manufacturers are now endeavouring to change the existing Kelvin numbers, by which the tubes are known, to colours such as " standard warm white," which is more in keeping with our practice. Thus the " Cool 4500 " tube is now being known as the " Standard cool white."

The store of S. Zuieback & Sons, Dearborn, Michigan

The " slim line " hot cathode tube is still the most popular with contractors, in spite of its lower efficiency, because of the easier maintenance when single plunger lampholders are used and of the quick starting features of this lamp.

" Circline " lamps are not used in great numbers in the commercial field, " standard " and table lamps being mainly preferred.

The materials that have made the greatest strides in the lighting industry have been glass and plastics. The use of photosensitive opal glass is evident in the more recent installations. An " egg-crate " louvre photographed in the glass gives the appearance of an opal panel at a distance, and there is a louvre cut-off. This is replacing metal " egg-crates " in recessed troughs and ceiling units. The initial cost of the glass is still very high but as production increases it should take a prominent place in the lighting field.

Illuminated glassware, patterned with various designs, utilizing the new self-fired resistance fire enamel applied to clear glass, is noticeable in various fluorescent panels and decorative glass.

Lenses for low brightness control of fluorescent lamps, made from water white crystal glass at relatively low cost, from continuous tank operation, were noticed in some of the fluorescent fittings, the manufacturer claiming that the decreased weight of these lenses as compared with metalware, made the fitting much lighter.

Most of the plastic sheets used are of " vinyl " plastic with wide or closely spaced corrugations, square crossed sections, and they are extensively used as luminous ceiling panels. Moulded plastic " egg-crates " for fitting bases were also noticed.

Thermo-setting resin glass fibre in various colours is being used for lighting panels in luminous ceilings.

Spectacular Neon Signs

Neon signs follow fairly closely the current practice in this country, with the exception that in the larger signs there are three, four or five tubes recessed in a letter, with a choice of colours to form a harmony and distinct pattern. Neon tubing in various colours, outlining the essential details of colourful mural decorations used to advertise " drive-in " theatres, is very spectacular and will, no doubt, spread and develop a new technique in this medium.

" Black-light " external signs, alternating with normal lighting, are being used in suburbs and districts where the general lighting of the surrounding area is not too high. The development of the new black-light blue glass fluorescent lamp and the increased efficiency of the outdoor fluorescent powders have given a fillip to this type of

sign and no doubt its use will extend to this country.

The best sign, in my opinion, was that of "Kodak" at Grand Central Station, New York, which consisted of a large interior sign 60ft by 18ft made up of colour transparencies illuminated from the rear by means of cold cathode tubes. The process of producing a large transparency is very costly but the effects are so spectacular that there is no doubt development must take place in this line to make it a proposition for commercial signs.

The above are a few examples which can be readily seen in the new buildings and stores that are being erected throughout the States. What is most predominant is the clever use of colours in perfect harmony, augmented by lighting. In every case, the effects of co-operation between the architect, contractor and lighting engineer are very apparent.

Faradians' Dinner

TECHNICAL training was the theme of the speeches at the annual dinner of the Faraday House Old Students' Association at the Savoy Hotel on 3rd November under the chairmanship of Mr. A. W. Berry, president of the Association.

When proposing the toast of "Faraday House" Sir Noel Ashbridge (director of technical services, B.B.C.) remarked that as a "consumer of the products" of the College he understood the doubt that was felt about its position in the educational set-up of to-day. The responsibility that would rest upon Faraday House in the future would be much greater than it had been in the last forty years. The demand for engineers of all ages had vastly increased; he was very sure it was not being met, in any grade. Electronics was entering all branches and becoming important to the national effort.

On paper there was nothing wrong with the man leaving the university; he was ready to go into research, but engineering was not run from the research department; he must look to the management side. Why was it that men were not more ready to go into jobs they used to occupy years ago at the age of 45? The fault was not with the colleges, but with the "planned promotion" system, which was termed "vertical mobility" in the United States, whereby a man went right up and then came right down; removed himself to another part of the country and commenced again. Sir Noel deplored the absence of post-collegiate experience one used to acquire under the old pupilage system. He also thought it was remarkable how men of 30 years of age acquired a new lease of life when they went abroad.

Dr. W. R. C. Coode-Adams (principal) responded to the toast. He intimated that future education trends had caused some revision of the examination syllabus, tending towards more rigid and fundamental mathematics, more to theory than practice; it was hard to say whether the change would be good or not. The extended syllabus would mean more work in college than in practice, but the "sandwich" system would be retained. The danger of the theoretician was that he formed a world of his own in which things either had a definite meaning or none at all, which was not true of life.

Mr. L. H. Short (past-president, F.H.O.S.A.) proposed the toast of "The Guests" and in responding Lt.-Gen. Sir Ronald M. Weeks said it was difficult to get two people to agree about technological education so the solution must be by "give and take" on both sides. Another stone was about to be thrown into the controversial pool by the publication of a report of the National Advisory Council for Education in Industry and Commerce (of which Sir Ronald is chairman) which would include recommendations for the technical colleges to play a larger part in such matters.

Old N'ions

THE annual dinner and reunion of the Old N'ions Association will be held on 8th December at the Connaught Rooms, W.C.2, the guest of honour being Sir John Kennedy, O.B.E. Membership of the Association is made up from past students of the Northampton Engineering College, Clerkenwell, and any past student can obtain a ticket from the Entertainments Secretary, Mr. B. H. Douthwaite, at "Sledmere," Barnet Lane, Elstree, Herts (Elstree 3141).

Commerce and Industry

Electronics Scholarships

Design and the Festival of Britain

THE fulfilment of important development work and other long-term contracts by Electric & Musical Industries, Ltd., has raised a need for increasing numbers of highly trained electronic engineers in its research and design companies. To meet this need E.M.I. Institutes, Ltd., has devised a scholarship scheme for a special four years' course in electronics. The scheme provides for a grant to each successful applicant of £50 per annum towards the fees of the course and in addition, in suitable cases, a maintenance grant of at least £50 per annum. In return, beneficiaries under the scheme are required to place their services at the disposal of the company for four years after the satisfactory completion of their course. The course consists of three years' full-time study at E.M.I. Institutes, embracing the recognized examinations held by the City and Guilds of London Institute, together with a year's practical experience (coupled with further studies) in the factories and workshops of E.M.I. Engineering Development, Ltd. Candidates should be in the age group of 16–18 years, preferably of higher school certificate standard in science. Directors of education in the counties and county boroughs and the headmasters of 1,500 schools are being advised of the scheme. Applications for enrolment should be made to the Principal, E.M.I. Institutes, Ltd., 10, Pembridge Square, London, W.2, by 1st December.

Brazilian Standards

All contracts, tenders and estimates for the Government of Brazil must now be based on the standards issued by the Brazilian Standards Association (Associacao Brasileira de Normas Tecnicas) and the acceptance of materials and methods of test must be to the same standards. We are informed that copies of all standards issued by the Brazilian Association are available at the British Standards Institution, 24-28, Victoria Street, London, S.W.1.

Winding the 1,000,000th Brook motor, which will be the first of a large batch of "BREMA" types intended for the dollar market

Brook Millionth Motor

Brook Motors, Ltd., will complete their 1,000,000th electric motor during November. This figure is in the industrial range from 1 h.p. upwards and does not include f.h.p. motors.

It will be a "BREMA" motor, the new type specially designed for the American market, and will be one of the first batch now coming off the production lines. This motor, however, will not go abroad; it will be used in the Huddersfield Works to drive the fans of the pneumatic tube system and be a permanent

For a recent evening football match between Southampton and Bournemouth and Boscombe the ground was illuminated by Simplex "Reflecto-Flood" units (see *Electrical Review*, 10th November)

exhibit for visitors to the factories. The motor is being purchased by all employees by voluntary subscription and will be formally presented by one of the oldest employees to the founder and chairman of the company, Mr. Ernest Brook, on 16th December. Mr. Brook will then start the motor on its first job. This date will be a day of celebration and the works will be *en fête* from 2.30 p.m. to 11.0 p.m. All kinds of amusements will be provided for employees, their relatives and children.

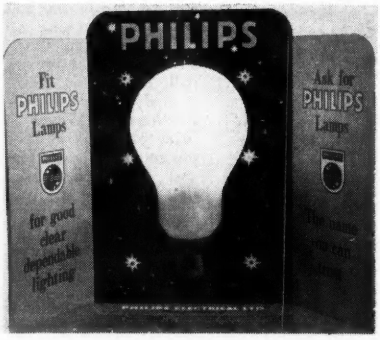
Grain Elevator Equipment for Argentina

One of the most complex electrical control boards made during recent years will shortly be shipped from Britain to Argentina. This board, which has been made by the General Electric Co., Ltd., will become the nerve centre of a 150,000 ton grain elevator, the largest south of the Equator, in Buenos Aires. The main contractors are Simon Handling Engineers, Ltd., of Cheadle Heath, Stockport, the total value of their contract being approximately £2,000,000, including G.E.C. electrical equipment to the value of about £300,000.

Lamp Publicity

Philips Electrical, Ltd., is maintaining its lamp publicity along the general lines of previous years. A life-size cut-out figure of a girl carrying a tray of Philips lamps is printed in natural colours and makes a very realistic floor display. For counter use the figure is cut down to head and shoulders. This counter-piece is 27in high by 20in wide. A giant reproduction of a pearl lamp has the wording " Philips Lamps " in colour constantly moving across its inner surface. This display is 22in high by 24in wide and makes an eye-catching centre-piece. Priced shelf strips printed in black and red on white are available for internal shop display. Prominent outdoor sign sites are being booked all over the country for signs on the style of the well known Trafalgar Square picture. In the London area the poster campaign " If eyes could only speak " is continuing. For the more specialized " Photoflux " photo flash lamps, a neat counter display and a separate showcard have been designed.

Philips illuminated lamp display



British Engineers' Association

At a luncheon of the British Engineers' Association on 9th November, with Mr. Keith Fraser (president) in the chair, the principal guests were the Hon. Eric J. Harrison, Resident Minister in London of the Commonwealth of Australia, and Sir Percivale Liesching, K.C.B., K.C.M.G., Permanent Under-Secretary of State of the Commonwealth Relations Office. In responding to the toast of the guests, proposed by Mr. Fraser, Mr. Harrison reviewed Australia's position and made special reference to the Snowy River hydro-electric scheme. Sir Percivale Liesching also replied to the toast. A vote of thanks was proposed by Mr. D. D. Walker (vice-president).

Commercial Travellers' Schools

Founded in 1845, the Royal Commercial Travellers' Schools have admitted over 4,800 boys and girls, orphans and needy children of commercial travellers. Over 230 children are being maintained and educated at the present time. The schools are supported entirely by voluntary contributions, but costs have risen and building repairs are required. The target is £50,000. Contributions for the list of the president should be addressed to Lt.-Col. M. W. Batchelor, J.P., Batchelors Peas, Ltd., Wadsley Bridge, Sheffield, or the Royal Commercial Travellers' Schools, Kings Court, 48, Broadway, London, S.W.1.

Modern Cable Making

In our article on " Modern Cable Making " (3rd November) the illustration on page 675 shows armouring machines and not paper covering machines, while Fig. 2 on page 677 depicts a vertical paper lapping machine not a stranding machine.

Board's Commercial Conferences

The South Western Electricity Board has recently held four conferences at Torquay and Taunton at which its commercial staff were shown the results to date of this year's sales campaign, and were also given a preview of the plans for the intensified Christmas sales drive. The theme of the Christmas drive is to be that " electric gifts make life easier," and the local staff were shown the specially designed material which had been produced as the basis of seasonal displays to link up with local and area advertisements and demonstrations.

Each conference was opened by one of the

Board's Sub-Area Managers, and the Board's secretary, Mr. H. D. B. Wood, laid stress on the particular importance of increasing the off-peak domestic load in the South Western Area, where half the electricity sold was in the domestic category. A feature of each conference was a talk by an independent expert on some aspect of salesmanship.

Industrial Design

Much of the activity of the Council of Industrial Design during the past year has been directed toward the 1951 Festival of Britain. In its report for 1949-50 an account is given of the progress made with the compilation of the "Stock List"—a pictorial card index of well-designed goods in current production as a basis for the selection of exhibits for the South Bank site and other exhibitions. It is intended to put the whole Stock List on show next year in the South Bank Exhibition under the title "Design Review"; it will be kept open for later additions. Already, says the Council, the Stock List has been consulted by a variety of interests for many purposes unconnected with the Festival.

Success attended the Design Fair arranged by the Council which visited seven large provincial towns. The Council also participated in the Ideal Home Exhibition and in other displays at home and abroad.

Pakistan Standards Institute

The Government of Pakistan, through its Ministry of Industries in consultation with various organizations in that country and abroad, has prepared a scheme for the establishment of a Standards Institute which will function under the control of the Director General of Supply and Development. The Institute will be managed by a General Council consisting of representatives of the Central Government, Provinces, and commercial and industrial interests. Since the full development of the Institute is likely to take some time, the Government has set up a Specification Revision Committee which has been charged with the task of simplifying, unifying and rationalizing the standards at present in use.

Cement Plant

It is announced that orders were recently placed with the British Thomson-Houston Co., Ltd., by the Associated Portland Cement Manufacturers, Ltd., for four synchronous induction motors of 1,200 h.p. at 3,000 V, 50 c/s, three phase with gear boxes for 750 to 20·5 speed reduction for driving two cement grinding mills, the starting of which demands 50 per cent more than full-load torque. Performance tests of four duplicates recently made for the same customer enabled a motor efficiency of 97 per cent to be guaranteed. The machines will operate at 0·95 leading power factor to compensate for the lagging p.f. of smaller induction motors in the cement works. The gear boxes will be of the double reduction, double helical, flexible twin drive type. The driven 750 r.p.m. pinion will engage with two medium speed wheels and, through quill shafts and gear couplings, with two pinions meshing with the 20·5 r.p.m. wheel, the low-speed shaft being connected to the mill through a gear type coupling and a special torque shaft.

An auxiliary motor will drive each mill at fractional speeds down to 0·375 r.p.m. through a barring gear box and an automatic coupling, so that it will be possible to bar the mill round and, at the same time, start the main motor. When the latter takes up load a mechanical clutch will automatically disengage the barring motor. All the above-mentioned equipment will be made at the Rugby works and thirty years' service will be demanded of it, since it is proposed to operate the cement mills for 8,000 hours yearly.

Hoover Sales Conference

The post-war progress of Hoover, Ltd., was reviewed, and the possibilities of the future discussed, at a conference of sales managers held at Harrogate from 1st to 3rd November. In all, including the wives of delegates, 350 people were accommodated at the Majestic Hotel, where the conference was held, and at the Cairn Hydro. The delegates included representatives from Ireland, France, Belgium, Holland and Switzerland. Mr. F. H. Bunn, director and general sales manager, was chairman of the conference and Sir Charles Colston, chairman of the company, the principal guest. In an address Sir Charles told his managers that in spite of economic difficulties at home and abroad the total number of cleaners sold last year was more than double that of the company's record pre-war year, while the demand for the electric washing machines both at home and abroad was so great that already important extensions were being made to the factory at Merthyr Tydfil in Wales and the company was negotiating with the Board of Trade for the doubling of factory space there. Another major post-war development had been the establishment of a factory at Cambuslang in the Scottish development area for the purpose of manufacturing fractional h.p. motors.

Accident Prevention Week

Many employees of British Insulated Callender's Cables, Ltd., took part in the Accident Prevention Week recently held at the Prescot, Melling and Willenhall factories. There were poster design and drama competitions, the themes of these being based on the safety campaign. Other events included a

unch-time concert, a whist drive and dance, a musical programme given by the Prescot Cable Works Band, and an evening concert featuring employee artistes and Peter Cavanagh as guest star. At the Prescot works one day was set aside for visitors and 1,700 people attended.

Trade Announcements

Mr. M. A. Hancock, who represents the **Sloan Electrical Co., Ltd.**, in part of Somerset, is now, in addition, representing the company in the South Wales Area, in succession to Mr. P. J. Cason.

Instruments and Controls (J. L. Record), Sandiway Place, Manchester Road, Altrincham (telephone : Altrincham 1333), have been appointed agents in Lancashire, Yorkshire, Cheshire and North Wales, for Everett, Edgcumbe & Co., Ltd. The direction and management of this new company will be in the hands of Mr. J. L. Record.

The Manchester branch of **Philips Electrical, Ltd.**, is now at 40, Little Lever Street, Manchester, 1, which incorporates a large showroom for all products in the Philips range. At the Liverpool branch, a new showroom was opened on 3rd November, at 6-10, Leeds Street. The Cardiff branch has moved to bigger premises at 11-13, Penarth Road, Cardiff, where a showroom will shortly be opened. At 27, Landport Terrace, Southsea, Portsmouth, a new lighting depot was opened on 9th November. Here also, a showroom is planned.

The address of **Boyce, Weir & Co.**, electrical wholesalers, is now 778, Newhey Road, Huddersfield.

Stuart & Co., electrical, radio and television wholesalers, have removed to 9-12, Middle Street, Hastings.

Elexcel, Ltd., has appointed Mr. J. E. Thorneycroft as representative for the East Midlands Electricity Board area. Mr. Thorneycroft was previously with the Hotpoint-B.T.H. organization and Falco Electric Appliances. Mr. P. G. Payne has been appointed as representative for the Midlands Electricity Board area. Mr. Payne has been with the M.E.B., having previously served in the Birmingham Electric Supply Department. He will operate from the company's office at 55, Cornwall Street, Birmingham, 3 (telephone : Colmore 4295/6).

Battery Packing

To protect its motor-car batteries during transport and storage the Young Accumulator Co., Ltd., an associate company of Crompton Parkinson, Ltd., has introduced new packings.

For the home market a sealed dustproof carton provides adequate protection against superficial damage in transit and keeps the battery clean during storage.

For the export market each battery will be contained in a "Resil" pack enclosed in a strong cardboard carton specially sealed. The "Resil" pack consists of thick resilient shock-absorbing material moulded in two halves to the shape and size of each individual battery, giving complete protection during transit and handling.

Quarries and Mines Regulations

Notice has been given by the Ministry of Fuel and Power of the intention to revoke both the Quarries (Electricity) and Metalliferous Mines Orders of 1947 since there is no longer any need for the war-time exemptions which they permitted. Both the regulations of 1938, as amended in 1945, are to be further amended so as to fix 1st January, 1953, as the date by which certain cables and other electrical apparatus installed on the surface of quarries and metalliferous mines must comply with the full constructional requirements of the general regulations.

Catalogues and Lists

Rich & Pattison (Birmingham), Ltd., 81 Jamaica Row, Birmingham, 5.—Priced and fully illustrated catalogue of decorative and commercial lighting fittings.

Sheffield Twist Drill & Steel Co., Ltd., Summerfield Street, Sheffield, 11.—Folder announcing the introduction of the new range of 25 Dormer Heli-Cut end mills.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Technical brochure on G.E.C. sound equipment and catalogue of "Aerofoil" fans.

Richard Sutcliffe, Ltd., Universal Works, Horbury, Wakefield.—Brochure on the preservation of conveyor belting.

Dawe Instruments, Ltd., 130, Uxbridge Road, London, W.7.—Technical leaflet describing a mains operated direct reading pH meter (0-14 pH) for laboratory use.

Reliance Telephone Co., Ltd., 39-41, Parker Street, London, W.C.2.—Folder describing intercommunication equipment.

INFORMATION DEPARTMENT

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following :—

Type SLJ9 Prepayment Meters.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Oil-filled Radiators

A THERMOSTATICALLY controlled oil-filled radiator is a new product of the GRUBB ENGINEERING CO., LTD., Birmingham, 12. The unit, which measures 27¾in wide by 19¾in high, including feet, is of attractive design and is finished in gold metallic paint. The price is £8 15s (plus £6 8s 6d P.T. in this country) for the ½ kW model and £9 9s (plus £6 16s 6d P.T.) for the 1 kW model.

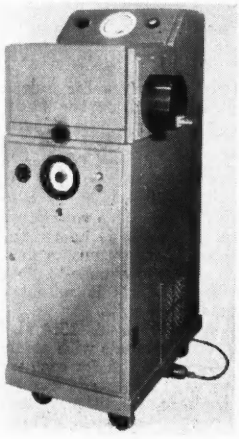
Induction Heating Unit

A 2 kW induction heating equipment made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, is intended for a wide range of applications and incorporates special features to permit the use of easily constructed heating coils, thereby making the equipment suitable as a general-purpose tool for processing batches of different articles.

Output control is by a single knob which adjusts the impedance matching of the load, so that the correct operating conditions for maximum valve life and efficiency are maintained at all times. Connection of the water-cooled heating coil is made by a coil block which can be adjusted to extend up to 5in from the side of the set to suit the work in hand. An effort has been made to reduce the overall running costs of the generator. The oscillator circuit uses a single valve protected by a voltage stabilizer in its filament supply. The generator is of robust construction and is mounted on large rubber-tyred castors. Supports for a work table are fitted to the side and the set is attractively finished in green and cream. It is available for operation on 360/440 V 3-phase mains.

Clothes Drying Cabinet

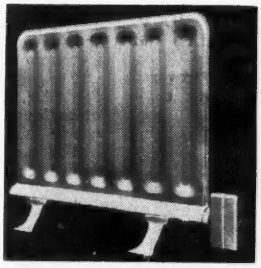
The "Eldac" all-steel self-contained electric clothes drying cabinet being marketed by ELECTRODAC, LTD., 8, Devonshire Road, Hatch End, Middlesex, has a capacity equivalent to 30ft of washing line while occupying a floor space of less than 3sq ft. A "black heat" element enclosed by a wire grid screen in the base of the unit is controlled by a three-heat switch. A green pilot light

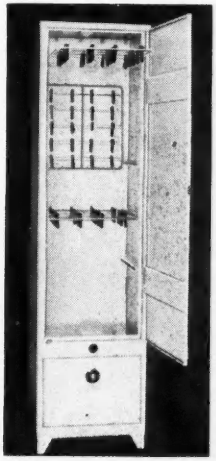


Left: G.E.C. induction heating unit

Right: "Eldac" clothes drying cabinet

Below: Grubb 1 kW oil-filled radiator





shows when the dryer-airer is working, and also illuminates the interior of the cabinet.

Pull-out, tip-up stainless steel wire shelves and plastic washable pegs ensure maximum clothes storage, flexibility and ease of loading. This feature prevents horizontal folds in the clothes which would trap the rising air and cause non-uniform drying. Heavy materials take about two hours to dry. For an average weekly wash about 4 kWh is consumed.

The cabinet, which is constructed of 20-gauge, doubly rust-proofed and stove-enamelled steel, is 21in wide by 19in deep by 81in high and weighs 130lb. External fittings are chromium plated. The price is £22 5s (plus £5 11s 3d P.T. in the U.K.).

Fittings for Tubular Lamps

A range of " Tubelight " lighting fittings introduced by ALLEN & POPE, LTD., 14, Shacklewell Lane, Dalston, London, E.8, accommodates from two to six standard b.c. opal tubular lamps. A two-light wall bracket is made to match.

Flush Push-Button Switches

ARROW ELECTRIC SWITCHES, LTD., Hanger Lane, Ealing, London, W.5, have re-introduced their range of flush type, quick make and break, push-button switches. Three types are available : single-pole on-off and single-pole 2-way rated at 5 A 250 V and also a double-pole on-off design rated at 10 A 250 V.

Preheating Pipe Joints

For preheating and stress-relieving welded pipe joints *in situ*, induction heating equipment has been designed by the QUASI-ARC CO., LTD., Bilston, Staffs.

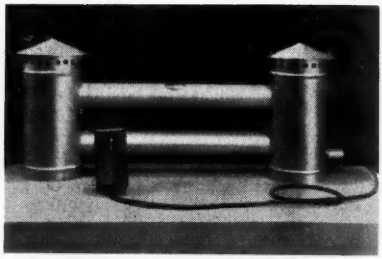
It is particularly suitable for use in positions of difficult access and comprises an oil-cooled transformer for induction heating giving a stepless regulation of current up to 600 A and of voltage from 1 to 100 V. Coils of heavy asbestos - covered copper cable are wrapped round the work to be heated and current from the transformer passing through this cable induces eddy currents in the work thus raising the temperature. Control of the heating current is by a motor-driven auto-wound voltage regulator in the primary circuit and it may be operated either at the transformer itself or by remote control push-button unit.

Quasi-Arc induction heating equipment for stress-relieving and preheating

The equipment is designed to operate from 400/440 V 50 c/s mains and has an intermittent output of 60 kVA ; maximum rating is 45 kVA.

Greenhouse Heater

The " Fayson " electric greenhouse heater, marketed by FACTREX PRODUCTS, LTD., Fayson House, Horley, Surrey, is available in two sizes—one 3ft 4in long, 18in high and 9in wide,



"Fayson" greenhouse heater

heating up to 600cu ft, and the other 6ft long and heating up to 1,100cu ft. Complete with thermostat the prices are respectively £5 5s and £7 12s 6d.

Industrial Valves

Two new " Osram " valves for industrial applications are announced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. The first, Type A 2151, is a high vacuum half-wave rectifier with a directly heated oxide coated cathode. It is only 5½in long and will withstand a peak inverse voltage of 150 kV. This voltage rating is obtained when the valve is housed in oil immersed equipment. Its output current is 1.0 mA maximum and its low anode-to-filament capacitance (0.35$\mu\mu$F) makes it suitable for use in radio frequency circuits.

The second valve, Type A 1834, is an indirectly heated double triode with an anode dissipation of 13 W at 125 mA for each triode unit. It has a very low anode resistance (280Ω under working conditions) and is designed to operate at an anode voltage of 132 V. Each section has a mutual conductance of 7.5 mA/V.

ELECTRICITY SUPPLY

15 Per Cent Output Increase in October

THERE was no change in the total generation capacity in the British Electricity Authority's area in October, but 9,000 kW was added in the North of Scotland. This made the aggregate for both areas 14,655 MW, compared with 13,609 MW a year ago. In the past twelve months, therefore, 1,046 MW has been added to the overall installed capacity.

During October the quantity of electricity generated attained the record figure of 4,830 million kWh, an increase of 14·9 per cent over the corresponding month of last year. The total included 170 million kWh from water power, whereas in October, 1949, only 76 million kWh was thus generated. Further details of output, fuel consumption, etc., are given in the accompanying table.

Pitlochry Power Station

The first generator in the Pitlochry power station of the Tummel-Garry hydro-electric scheme was recently tested at full load. The second generator is expected to come into production soon.

Eastern Tariff Changes Postponed

Having considered the decision of the Consultative Council to make a representation to the British Electricity Authority on the proposed variations of tariffs, the Eastern Electricity Board has decided to postpone the introduction of the tariff variations until 15th January, 1951, in order to allow ample time for consultation between the B.E.A. and the Consultative Council.

Fort William Explosion

A diesel-engine building at the Fort William power station was badly damaged on 7th November by an explosion followed by fire. Several electricians were having their midday meal in a room next to the engine-house just before the explosion occurred. They were warned by the engine-room attendant of the danger, and had just left the building when the explosion occurred. One of the men was struck by a door torn from its hinges by the blast. The fire brigade, using foam apparatus, prevented the fire from spreading to the main building of the power station. Electric power was cut off in Fort William for about an hour. The British Aluminium Company has offered to assist the North of Scotland Hydro-Electric Board in every way possible in supplying electricity to Fort William.

Glasgow Contract

Glasgow Corporation Transport Committee has agreed to place a contract for new plant for Pinkston power station—which supplies power for tramways—with the Metropolitan-Vickers Electrical Co., Ltd., on condition that a sub-contract, valued at £80,000, is given to the Glasgow engineering firm of G. & J. Weir, Ltd. The whole contract is valued at £250,000. Previously, when the placing of the contract with Metropolitan-Vickers was recommended, strong representations were made on behalf of Glasgow engineering employers and employees that as much as possible of the work should be done locally. It was stated last week that the condenser was the only part of the installation that could be made in Scotland.

Power Station Scheme Opposed

A proposal by the British Electricity Authority to construct a power station at Elton, Cheshire, is opposed by the Town and Country Planning Committee for the County Council which is asking the Council to object to

Electricity Generated, Fuel Consumed and Plant Capacity

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water Power	Total*		
British Electricity Authority ..	2,760	5.4	4,623	60	4,699	4,436	14,213
North of Scotland	13	1.1	16	110	131	129	442
Total for October, 1950	2,773	6.5	4,639	170	4,830	4,565	14,655
Total for October, 1949	2,496	5.2	4,111	76	4,204	3,964	13,609
Increase, per cent	+11.1	+25.0	+12.8	+123.7	+14.9	+15.2	+7.7
Total for year to date (10 months)	25,239	53.7	42,370	1,191	43,742	41,285	—
Total for first 10 months of 1949 ..	23,203	40.8	38,202	903	39,264	37,011	—
Increase, per cent	+8.8	+31.6	+10.9	+31.9	+11.4	+11.5	—

* Includes generation by oil engines and waste heat plants (11.2 million and 9.9 million kWh respectively in October).

the scheme. The Committee considers that the amenities of Helsby, Ince and Elton would be injured. It is also pointed out that the site is in an area which has been reclaimed for agriculture at considerable cost. The Committee states that no satisfactory proposals have been put forward for the disposal of the ash, and the provision of public services, particularly water, is likely to be difficult. In the Committee's opinion most of the obstacles could be overcome by extending the station at Connah's Quay.

Huncoat Station Extension

Consent of the Minister of Fuel and Power has been received by the British Electricity Authority for the completion to its full capacity of the new Huncoat power station, Accrington, Lancs. The authorization covers the installation of two turbo-generator sets, each of 30 MW, two boilers each with an evaporative capacity of 305,000 lb/hr, and a cooling tower. The completed station will have an installed capacity of 120 MW.

Electricity Reserves

The South East Scotland Electricity Consultative Council, meeting in Edinburgh on 6th November, decided to accept the decision of the Minister of Fuel and Power, Mr. Philip Noel-Baker, that there was no ground on which he could intervene in the matter of returning the £1,042,000 reserve funds in the Area at vesting date. At the same time, however, the Council associated itself with a strongly-worded letter to the Ministry from the South East Scotland Board in which it was stated that the reasons given for refusal to return the reserves revealed a misunderstanding of the Board's attitude and were profoundly disturbing because they gave rise to serious doubts about the correct interpretation of the Electricity Act, 1947. The Minister's predecessors, and other Ministers, had repeatedly emphasized the large measure of independence enjoyed by Area Boards: but no such measure of independence was compatible with the liability of an Area Board to be deprived of a valuable asset, without proper compensation, by the Central Authority.

Scottish Dispute Settled

Agreement has now been reached between the British Electricity Authority and the North of Scotland Hydro-Electric Board with regard to the conditions for the supply of power from the Loch Sloy generating station opened by the Queen last month. A statement issued by the B.E.A. says that the Authority is satisfied that if it took the supply allocated to it by the North of Scotland Board for the week at the rate at which the Board want to deliver it, the supply would be exhausted in ten hours, which, in seasonable weather, would cover five hours during the peak periods each day for only two days of the week. The Authority would have preferred to distribute the supply over the peak periods during the whole week. Nevertheless, as these are the only conditions under which the Scottish Board will offer the supply, the Authority has decided to accept them rather than deprive people of electricity.

Electrical Statistics

Ministry of Fuel Annual Digest

THE Statistical Digest prepared by the Ministry of Fuel and Power for 1948 and 1949 (H.M. Stationery Office, 7s 6d) is considerably larger than its predecessors. It embodies material relating to gas and electricity previously published separately.

In the 200 pages many aspects of the coal, petroleum, gas and electricity supply industries are thoroughly covered. It is shown that the total production of coal in 1949 was 215 million tons (against 210 million tons in the preceding year, 240 million tons in 1937 and as much as 276 million tons in 1923). Of the total, in 1949 the electricity supply industry took 30·2 million tons (against 28·9 million in 1948). Supplies to gasworks rose from 24·3 to 25·7 million tons.

Electric motors were in use in 1,410 mines in 1948 out of a total of 1,718 mines. They numbered 81,100 (2,831,300 h.p.) as compared with 77,000 (2,736,600 h.p.) in 1947; of these 46,700 (1,572,500 h.p.) were underground. The principal applications were haulage and pumping (547,200 h.p. and 478,300 h.p. respectively). Above ground, winding (227,000 h.p.), cleaning and screening (266,500 h.p.) and air compressors (203,700 h.p.) employed about half of the motor power.

Tables relating to electricity supply occupy 27 pages and they contain considerable detail of plant installed (boilers and generators), operation figures including costs and efficiencies, particulars of production and distribution, capital expenditure and personnel. The bulk of this information carries the story up to 31st March last, which was the end of the British Electricity Authority's first year of operation. Consequently much of the statistical matter appeared in the B.E.A.'s 1948-49 report. In this form, however, reference is facilitated, a good deal more detail is given and some of the B.E.A.'s figures were provisional.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Tube Investments, Ltd., in a preliminary statement, reports trading profits, after deducting depreciation, for the fifty-three weeks ended 5th August last of £6,024,839, as compared with £4,840,467 for the preceding year, which with other income of £257,812, makes £6,282,651. Provision for taxation requires £3,583,223, leaving a group net profit of £2,699,428 (against £2,064,382) and after allowing for outside interests, £12,527, and adjustments relating to previous years, the amount available is £2,825,420. Of this total £477,698 is retained by subsidiaries. It is proposed to pay a final dividend on the ordinary stock of 12½ per cent, making 25 per cent for the period and at the same rate relatively on the liaison ordinary shares. The distribution for the previous year was the same. The balance carried forward is £294,152 (against £107,198 brought in).

J. & F. Stone Lighting & Radio, Ltd.—In his statement issued with the report and accounts Mr. D. G. Nairn (chairman) says that steady progress has been made by all departments during the year under review. The turnover of the companies within the group, both in cash receipts and hire purchase, constitutes a record. Since 1st July last the rate of turnover has increased still further.

The Electrolytic Zinc Co. of Australasia reports that after providing £500,000 for amortization and depreciation, £100,000 for mine depreciation and £892,000 for taxation, the net profit for the year to 30th June last is £1,229,841, as compared with £1,068,600 for the preceding year. Reserve for new plant and development at Risdon receives £300,000, a sum of £49,223 is allocated for new plant and development of West Coast mines and general reserve receive £150,000. The dividend for the year is 15 per cent, and a bonus of 10 per cent is also paid (both unchanged). The balance carried forward is £271,263 (against £220,645 brought in).

Heenan & Froude, Ltd., report a group profit for the period 1st September, 1949, to 2nd September, 1950, of £327,358, as compared with £242,546 for the preceding year, and a net profit of £134,261 (against £102,102). General reserve receives £75,000, and the final ordinary dividend is 10 per cent, making 15 per cent for the period (unchanged). The balance carried forward is £26,853 (£17,178) in subsidiaries and £39,291 (£47,434) in Heenan & Froude. It is proposed to capitalize £42,532 10s out of capital reserves and distribute to ordinary shareholders 170,130 ordinary shares of 5s each in the proportion of one for every ten shares held.

Enfield Cables, Ltd., is paying an unchanged interim dividend of 3¾ per cent.

New Companies

G.K. Distributors (Durham), Ltd.—Registered 2nd November. Capital £1,000. Wholesale and retail dealers in electrical components of all kinds, including radio and television sets, etc. Subscribers : A. J. C. Hirst and Margaret R. Monk. Solicitors : Dickons, Aked and Hirst, Bull Green House, Halifax.

G.K. Distributors (Gateshead), Ltd.—Registered 2nd November. Capital £1,000. Objects and other particulars similar to those of G.K. Distributors (Durham), Ltd.

Jarvis & Evered, Ltd.—Registered 2nd November. Capital £6,500. Electricians, electrical and mechanical engineers, etc. Directors : B. J. Freestone, A. E. Howe and W. Cann. Regd. office : 11a, Kingston Road, Taunton, Som.

Palmer & Gilbert, Ltd.—Registered 3rd November. Capital £500. Electrical installation contractors, etc. Directors : H. J. Palmer, J. R. Gilbert, D. W. Taylor and E. H. Scott. Regd. office : 35, Sandpit Road, Welwyn Garden City, Herts.

Edgware Refrigeration & Electrical Supplies, Ltd.—Registered 4th November. Capital £2,000. Directors : F. L. Knowles, H. Lehmann and M. Hurt. Regd. office : 425, Kingsbury Road, N.W.9.

Electrical Eutechnics, Ltd.—Registered 4th November. Capital £500. Electrical and refrigeration engineers, etc. Directors : A. J. W. Robinson, Mrs. Florence E. Robinson, A. W. R. Robinson, A. G. Norfolk and A. Bone. Regd. office : 52, Brisbane Road, Ilford.

Primary Electric (Birmingham), Ltd.—Registered 3rd November. Capital £1,000. Electrical contractors, and engineers, manufacturers of and dealers in electrical components and accessories, wireless sets, etc. Directors : E. Vipond and Mrs. Anne E. Vipond. Regd. office : 150, Yardley Road, Birmingham, 27.

A. & V. Baxter, Ltd.—Registered 4th November Capital £2,500. To acquire the

business of electrical engineers and contractors carried on by G. A. and V. G. F. Baxter at 27, Somerset Close, New Malden, Surrey. Directors : V. G. F. Baxter and G. A. Baxter. Regd. office : 49 High Street, Croydon, Surrey.

African Electric (London), Ltd.—Registered 4th November. Capital £100. Manufacturers and repairers of and dealers in dynamos, armatures, magnetos, batteries, cookers, etc. Directors : K. Neumann, H. W. A. Martinussen and G. H. Neumann. Regd. office : 19/23, Oxford Street, W.1.

Midland Transformer Co., Ltd.—Registered 31st October. Capital £10,000. Electrical, radio and mechanical engineers and contractors, etc. Directors : E. A. Hinksman and H. M. Stevenson. Regd. office : 38, Freeth Street, Ladywood, Birmingham, 16.

Private Arrangements

Underwood (Electric), Ltd., electrical wholesalers, 200, Great Portland Street, London, W.1.—An informal meeting of creditors was held on 7th November at Winchester House, Old Broad Street, London, E.C., when the chair was occupied by Mr. S. H. Gillett, of Dixon, Wilson, Tubbs & Gillett, C.A., 24, Basinghall Street, London, E.C., who was appointed receiver by the debenture holders on 15th July last. According to the statement of affairs the liabilities amounted to £49,939, of which £24,762 was due to the debenture holders and £25,177 to unsecured creditors. The assets at book value were put down at £61,533 and were estimated to realize £27,228, but from the latter figure had to be deducted £2,567 for preferential claims, leaving net assets of £24,661, or a deficiency as regarded creditors of £25,278 (subject to realization, costs, receiver's remuneration and any losses on trading since the appointment of the receiver). The issued share capital of the company was shown as £24,000 and, so far as the shareholders were concerned, there was a deficiency of £49,278. An advisory committee was appointed consisting of the representatives of General Electric Co., Ltd. ; Siemens Electric Lamps & Supplies, Ltd. ; General Accessories Co., Ltd. ; Edison Swan Electric Co., Ltd., and Fosters Electric Supplies Co., Ltd., to co-operate with the receiver.

Liquidations

Bonham Electrical & Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. K. Dotchin, 28, Mosley Street, Newcastle-on-Tyne.

Bankruptcies

D. L. Smith, lately carrying on business at Midland Bank Chambers, Cefn Road, Old Colwyn, Denbighshire, electrical contractor.—Receiving order made 3rd November on a creditor's petition. First meeting held 16th November. Public examination 15th December at the Court House, Deiniol Road, Bangor.

R. S. Warrell, trading as R. S. Warrell & Son, electrician, 2 Norfolk Road, Littlehampton.—Order made 21st September suspending discharge for two months until 21st November, 1950.

H. Walby, 86, Hill Rise, Richmond, Surrey, electrical engineer.—First meeting 21st November at 3, Central Buildings, Matthew Parker Street, London, S.W.1. Public examination 19th January at the Court House, Wandsworth, S.W.18.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 8th November.

HOOVER. No. B680,079. Class 7. Washing machines, electric motors (not for land vehicles), electric clothes rinsing machines, shoe polishing machines, window cleaning machines and butter churns ; floor polishing and floor waxing machines (not for domestic use) ; and hairdressing, floor scrubbing, ironing, mixing (domestic), saucepan scouring, tin-opening, juice extracting or squeezing, grinding (domestic), vegetable peeling machines, potato chipping, vegetable slicing, fish cutting and preparing, and bread or bacon slicing machines. HOOVER. No. B680,778. Class 11. Electrically heated clothes drying apparatus, electrically operated toasting apparatus, refrigerating apparatus, electrically operated room heating apparatus, hair drying appliances, electric fans, ovens, cooking ranges, and electrically operated water heaters.—Hoover, Ltd., Perivale, Greenford, Middx.

ANSIFLOW. No. 687,991. Class 9. Electric welding apparatus and parts and fittings therefor included in Class 9.—L'air Liquide Société Anonyme pour l'Etude et l'Exploitation des Procédés Georges Claude, Paris. Address for service, c/o Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

AMBASSADOR OF GREAT BRITAIN (design). No. 683,739. Class 9. Radio receiving and transmitting apparatus, sound reproducing apparatus, sound recording and transmitting apparatus and public address apparatus, television apparatus, radio-gramophones, vacuum cleaners, electric flat irons, electric domestic utensils included in Class 9, and parts.—R. N. Fitton, Ltd., Radio Works, Hutchinson Lane, Brighouse, Yorks.

PARPAK/CONTRO. No. 688,867. Class 9. Electrical apparatus and instruments included in Class 9 ; wireless and television receivers and parts ; and measuring, signalling and teaching apparatus and instruments.—Leeds Model Co., Ltd., Potterdale Mills, Dewsbury Road, Leeds, 11.

SUPERCLAD. No. 690,401. Class 9. Electric batteries.—Park Brothers, Ltd., Brunswick Works, Canterbury Street, Blackburn.

CALLINAN. No. 681,367. Class 11. Electrically operated hair drying appliances.—Callinan Giles & Co., Ltd., 9, Newman Street, London, W.1.

STOCKS and SHARES

BUSINESS in the Stock Exchange continues to run on steadily improving lines. One noticeable development which has come to the front in recent weeks has been the change-over from what may be called the small investor to companies engaged in insurance, banking, investment trust and similar financial business. The smaller man has little opportunity of saving money under the present penal scale of taxation and the high cost of living, but the companies such as those just mentioned possess funds which are always piling up, and which have to be employed, somehow or other, in order to give the shareholders in them a reasonable return on their money. This furnishes a bulwark of support when the news, foreign or domestic, takes an unfavourable turn. The adage that money makes money was never more appropriate than it is to-day.

Tube Investments Results

An initial reduction from £6⅜ to £6 3/16 in the price of Tube Investments £1 ordinary shares, following the dividend and preliminary profits statement, confirms the popular conception that while the market likes to see high earnings, it likes even better to see them distributed. Trading profits of the group rose by well over a million during the year ended last July, to a total exceeding £6 million. Taxation took half a million more than last time, but the net balance is still £600,000 above the previous figure. The dividend, however, is unchanged at a total of 25 per cent, a rate which appears to be covered five times by the amount available. It leaves the shares on a yield basis of 4 per cent, which shows that, for most stockholders, the impressive development which has taken place in the group's earning capacity carries more weight than does the immediate dividend return.

Company News

Dictograph Telephones profits for the year ended in August come out a few hundred pounds above the £50,000, net, earned in the previous period, for which the dividend was raised from 16 to 20 per cent. That rate is again being paid, and, with the 2s shares at 5s 6d, it gives 7¼ per cent on the money. Notably good results were published earlier by Sun Electrical. Profits after tax were nearly 50 per cent up at £33,000. An extra 2½ per cent on last year's rate gives shareholders this time a dividend of 10 per cent. This will cost little more than £5,000 net, against £28,000 available after payment of the preference dividend. The £1 shares appear to change hands rarely, but at the official quotation of 22s 6d the yield is over 8¾ per cent.

The Week's Price-Changes

British Electric Traction deferred stock has risen 30 to 485. Amongst the shares given in our monthly lists, Cawnpore Electrics at 28s 9d are 4s 3d up since a week ago. Burco, on the bonus payment, put on a florin at 25s 9d. Revo, 44s 6d, and C. A. Parsons, 73s 9d, are both 1/16 better, while Hoovers have risen to the round 50s and Enfield Cables to 32s. In the falls, the outstanding decline is in British Aluminium at 40s 3d, the drop of 3s 3d being due to the coming new issue. Great Northern Telegraphs, 13½, are 10s down and Oriental Telephones, 43s 9d, have lost 1/16. Vactrics fell 9d to 8s 9d. Other falls are mainly 3d to 6d per share. Hackbridge & Hewittic retain the rise to 16s, resulting from the interim dividend increase to 5 per cent, against 4 per cent a year ago.

Dividend Outlook

The future of the voluntary dividend limitation agreement becomes increasingly a matter of consequence to the holders of many electrical and other industrial shares. In the past month or two, quite a number of increases have appeared in the dividend lists. The great majority have borne conspicuously the mark of moderation and restraint; and there seems to be a growing disposition to regard that, rather than rigid abstinence, as the fair and justifiable interpretation of the limitation agreement in modern conditions. Presumably the attitude of the big concerns will not become established until the results and rewards for 1950 begin to appear in the early part of next year, although it is noticed that some of the giants, Vickers among them, have tentatively permitted themselves to relax a little in the matter of their interim dividends.

Conservative Payers

If yields on present dividends are anything to go by, there is considerable confidence in the signs that moderation will by degrees replace limitation in dividend policies. Much of recent investment in industrials has favoured the companies paying dividends far below the rate which would normally be expected from their earning capacity. Many people are looking for a sign from the Lucas dividend due this month. Other dividends which are singled out by the electrical equipment market as being much below earnings include those of A.E.I., B.I.C., Ericssons, Chloride Electric, Automatic Telephone, Laurence Scott, British Thermostat, Taylor Tunnicliff, Allen West and London Electric Wire.

NEXT WEEK'S EVENTS

Monday, 20th November

BIRMINGHAM.—Grand Hotel. Birmingham Electric Club. "The Story of Copper from the Mining Side onwards," by H. J. Miller.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "The Design, Specification and Performance of High-Voltage Surge Diverters," by H. F. Jones and C. J. O. Garrard.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. Informal lecture on "The Nervous System as a Communication Network," by J. A. V. Bates.

At the London School of Hygiene & Tropical Medicine, Gower Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers. "Ultrasonic Generators for High Powers," by Dr. B. E. Noltingk.

St. Ermin's Hotel, S.W.1, 6.50 p.m. A.S.E.E. Central London Branch. "Electricity in Agriculture," by W. Cover.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. "A New Precision A.C. Voltage Stabiliser," by Dr. G. N. Patchett.

Tuesday, 21st November

CHIPPENHAM.—Westinghouse Works, 6.45 p.m. I.E.E. Bristol Students' Section. "Speed Control of Induction Motors," by Dr. D. C. Flack.

GLASGOW.—Grosvenor Restaurant, 6.30 p.m. I.E.E. Scottish Centre. Dinner-dance.

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. "Servo Mechanisms," by P. G. Briggs.

Magnet House, Kingsway, W.C.2, 6.30 p.m. Association of Supervising Electrical Engineers. "Electricity in the Aeronautical Industry," by F. E. Buckell. (Joint meeting with the Institution of Engineers-in-Charge.)

LOUGHBOROUGH.—The College, 6.30 p.m. I.E.E. East Midland Centre. "The Reconstruction of the Italian State Telecommunications 1943–45," by Major H. E. Knight.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Measurements Group. "Routine Testing Equipment for Transformer Steels," by N. F. Astbury, Dr. T. Emmerson and J. McFarlane.

Wednesday, 22nd November

BLACKBURN.—N.W.E.B. Demonstration Theatre, Darwen Street, 7 p.m. I.E.E. North Lancashire Sub-Centre. "The Cost and Efficiency of Earthing on Low- and Medium-Voltage Overhead Line Systems," by L. Gosland.

BRIGHTON.—Technical College, 6.30 p.m. I.E.E. Southern Centre. Discussion on "Standardization."

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "The Influence of Rectifier Harmonics in a Railway System on the Dielectric Stability of 33-kV Cables," by S. B. Warder, Dr.-Ing. E. Friedlander and Dr. A. N. Arman.

I.E.E. London Students' Section, 2.30 p.m. Visit to J. Lyons & Co., Ltd., Cadby Hall.

Waterloo Bridge House, S.E.1, 5 p.m. Institution of Post Office Electrical Engineers. Informal meeting. "Wage Incentive Systems," by W. Hawking.

Thursday, 23rd November

BRADFORD.—Y.E.B. Offices, 45-53, Sunbridge Road, 7.30 p.m. I.E.S. Bradford Group. "Lighting in the Home," by Miss M. Wardlaw.

LONDON.—At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 5.30 p.m. Institute of Fuel. "The Performance and Efficiency of an 800 lb/sq in Pulverized-Fuel-Fired Boiler Plant over a Period of 20 Years," by Dr. J. A. Cooper and L. W. Young.

RUGBY.—The Temple Speech Room. I.E.E. Rugby Sub-Centre. Faraday Lecture. "Lamps and Lighting—a Record of Industrial Research," by L. J. Davies.

SALTBURN-BY-THE-SEA.—Zetland Hotel, 7 for 7.30 p.m. I.E.E. Tees-Side Sub-Centre. Annual dinner and visit of President.

Friday, 24th November

LEEDS.—Queen's Hotel, 7 for 7.30 p.m. I.E.E. North Midland Centre. Annual dinner and visit of President.

LONDON.—Storey's Gate, S.W.1, 5.30 p.m. Institution of Mechanical Engineers. Discussion on the "Standardization of Steam Turbo-Generating Plant." Opened by I. V. Robinson.

39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. Annual general meeting and annual meeting of contributors to the Benevolent Fund.

STONE.—Crown Hotel, 8.30 p.m. I.E.E. North Staffordshire Sub-Centre. Annual dance.

Saturday, 25th November

HUDDERSFIELD.—Y.E.B. Offices, Market Street, 2.30 p.m. I.E.E. North Midland Students' Section. Sheffield Exchange Paper. "Sound Film Production," by H. Bache.

Scientific Film Congress

THE International Scientific Film Association's fourth annual Congress and Festival of Scientific Films was held in Florence from 14th to 22nd October. Great Britain was represented by a delegation of ten members, including representatives of the Scientific Film Association of Great Britain, the British Council and the Royal Photographic Society. Britain also contributed about 30 per cent of the total of 120 films. Among the most important decisions reached during the Congress were the setting-up in Brussels of the first international reference film library of scientific films; the adoption of a standard system of recording and interchanging internationally, information about scientific films; and the production by international effort in common of a film on meteorology, for which a first treatment has already been prepared. Valuable progress on the part of the Research Committee and the Medical Committee was reported. Mr. J. Maddison (Great Britain) was elected president for 1950–51.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1945

31092. Amalgamated Wireless (Australasia), Ltd.—Periodic and automatic electric motor reversing circuit. 19th November, 1945. (647580.)

31372. Henry, P.—Snap acting control devices, applicable to electric switches, fluid control valves, and the like. 21st November, 1945. (647522.)

1946

3533. Compagnie Générale d'Electricité.—Electric wave filters and separators. 4th February, 1946. (647523.)

24007/8. Philips Lamps, Ltd.—Noise reducing arrangements for discharge-tube amplifiers. 13th August, 1946. (647463/4.)

30424. British Thomson-Houston Co., Ltd.—High-frequency electronic discharge devices. 11th October, 1946. (647465.)

1947

2683. Maschinenfabrik Oerlikon.—Power-generating plant for ships. 28th January, 1947. (647468.)

5709. British Thomson-Houston Co., Ltd.—High-frequency magnetrons. 27th February, 1947. (647470.)

10210. Keith-Murray, P. I.—Electronic pulse generating circuit. 15th April, 1948. (647475.)

12378. Philips Lamps, Ltd.—Circuits for producing saw-tooth current in an inductance coil. 7th May, 1947. (647478.)

14175. Westinghouse Electric International Co.—Electrostatic dust precipitators. 28th May, 1947. (647481.)

14517. Radio Corporation of America.—High-frequency amplifiers. 2nd June, 1947. (647482.)

19975. Philips Lamps, Ltd.—Means for preventing overload in electric amplifiers. 24th July, 1947. (647488.)

22977. Philips Electrical, Ltd.—Electric discharge tubes. 19th August, 1947. (647497.)

25077/8. Westinghouse Electric International Co.—Control systems for alternating current motors. 12th September, 1947. (647534/5.)

29500. Standard Telephones & Cables, Ltd., and Gayford, M. L.—Electro-acoustic transducers. 29th October, 1948. (647539.)

30184. Taylor, J. L., and Taylor, A. E.—Temperature-sensitive electric alarm or cut-off means. 13th November, 1948. (647505.)

30645. Automatic Telephone & Electric Co., Ltd., and Williams, M. O.—Vehicle detectors. 19th November, 1947. (647403.)

31227. Naamlooze Vennootschap Philips' Gloeilampen-Fabrieken.—Cross-bar switches for use in automatic telephone systems. 25th November, 1947. (647506.)

32247. Davis & Son, Derby, Ltd., J., and Davis, W. H.—Solenoid-operated electric bells. 6th January, 1949. (647510.)

32472. Soc. Francaise Radio-Electrique.—Alarm signal discriminators and transmitters. 9th December, 1947. (647511.)

32975. Gretener, E.—Electro-mechanical control device. 15th December, 1947. (647512.)

34898. Hansen, H. C.—Electro-thermo-switch for fire alarm systems. 30th December, 1947. (647359.)

35194. Naamlooze Vennootschap Philips' Gloeilampen-fabrieken.—Radio navigational aid systems. 31st December, 1947. (647549.)

1948

1125. Cooke, F. G.—Electric hair-dryers. 9th December, 1948. (647291.)

1607. British Thomson-Houston Co., Ltd.—Fluorescent lamp starter switches. 19th January, 1948. (647411.)

2585. British Thomson-Houston Co., Ltd.—Vitreous coating compositions for electric insulators. 28th January, 1948. (647414.)

2802. Automatic Telephone & Electric Co., Ltd., and Baker, D. T.—Measuring arrangements. 26th January, 1949. (647360.)

3177. Belling & Lee, Ltd., Strafford, F. R. W., and Prestige, H. T.—Quick-action springs for electrical switching devices. 3rd February, 1949. (647553.)

4618. British Thomson-Houston Co., Ltd.—Boring bars. 17th February, 1948. (647421.)

4791. Roberts Radio Co., Ltd., and Roberts, H.—Electric table lamps. 8th February, 1949. (647422.)

5444. Pedersen, S. L.—Connection of conductors to electric components. 24th February, 1948. (647426.)

5849. Piezo Crystals, Ltd., Birt, A. W., and Richardson, J. W.—Mountings for piezo-electric crystals. 28th February, 1949. (647431.)

6334. Guardian Electric Manufacturing Co.—D.C. impulse operated selector switch. 28th February, 1948. (647557.)

6584. Butter, F.—Phase conversion of electrical energy. 4th April, 1949. (647435.)

6602. Maschinenfabrik Oerlikon.—Apparatus for the regulation of voltage in mercury arc rectifier systems. 2nd March, 1948. (647436.)

6688. Metropolitan-Vickers Electrical Co., Ltd., and Fowler, J.—On-load tap changers for electric transformers. 18th March, 1949. (647438.)

7880. Du Mont Laboratories, Inc., A. B.—D.c. amplifier. 16th March, 1948. (647285.)

8442. Mallory Batteries, Ltd.—Alkaline dry cell and depolarizer therefor. 22nd March, 1948. (647362.)

8601. Jackson Boilers, Ltd., and Gudgeon, E.—Control of self-feeding water boilers. 19th March, 1949. (647565.)

13787. Standard Telephones & Cables, Ltd., Wolfson, H., and Thomson, B.—Electroplating. 21st May, 1948. (647303.)

14257. Marconi's Wireless Telegraph Co., Ltd., and Gamlen, D. R.—Pre-selector devices suitable for use for control and adjustment of radio equipment. 26th May, 1948. (647370.)

14488. Sperry Gyroscope Co., Ltd., Dove, F., and Sedgfield, H. B.—Variable resistors and potentiometers. 25th April, 1949. (647307.)

16408. Imperial Chemical Industries, Ltd., Duncan, A. I. S., and Moore, J. G.—Electrolytic process and apparatus. 17th June, 1949. (647313.)

17549. Pucci, M.—Terminal connectors for electric accumulators. 30th June, 1948. (647319.)

18410. Metropolitan-Vickers Electrical Co., Ltd., Shand, G., and McQueen, J. G.—Electrical screening. 8th July, 1949. (647442.)

20289. Speed Development Co., Ltd., Ruffle, W. H., and Fuller, R. C.—Fluid-pressure operated electric switches. 23rd June, 1949. (647445.)

20836. British Thomson-Houston Co., Ltd.—Preparation of polysiloxane resins. 6th August, 1948. (647322.)

21063. Butlers, Ltd., and Bunch, A.—Vehicle and other lamps. 19th July, 1949. (647374.)

22267. Philips Electrical, Ltd.—Electric discharge tubes. 24th August, 1948. (647375.)

22486. English Electric Co., Ltd., Ball, R. D., and Longden, J.—Dynamo-electric machines and manufacture thereof. 26th August, 1949. (647575.)

23155. Levers, J. F., and Patchett, R. V.—Electrical devices. 1st September, 1949. (647377.)

23254. English Electric Co., Ltd., and Wilson, F.—Pantograph type current collectors. 26th August, 1949. (647576.)

25463. Leyton, E. M.—Television transmitting systems. 14th September, 1949. (647383.)

25932. English Electric Co., Ltd., Frankel, A., and Mitchell, A. B.—Gas turbine blading. 16th September, 1949. (647384.)

25933. English Electric Co., Ltd., and Frankel, A.—Elastic-fluid turbines. 16th September, 1949. (647385.)

25935. English Electric Co., Ltd., Frankel, A., and Mitchell, A. B.—Gas turbines. 16th September, 1949. (647386.)

28423. Westinghouse Electric International Co.—Gas turbine power plants. 2nd November, 1948. (647451.)

28430. British Thomson-Houston Co., Ltd.—Commutators for dynamo-electric machines. 2nd November, 1948. (647326.)

28437. Sawyer, W. A.—Electro-magnetic solenoids for operating valves. 2nd November, 1948. (647453.)

29085. Standard Telephones & Cables, Ltd., Daly, C. T., Green, D., and Shepard, S. C.—Temperature dependent resistances. 9th November, 1948. (647331.)

29905. British Vacuum Cleaner & Engineering Co., Ltd., Ind, W. G., and Whiteside, D. A.—Electric suction cleaning machines. 3rd November, 1949. (647455.)

30142. Standard Telephones & Cables, Ltd., Delamore, A. C., and Beamont, W.—Electric discharge devices. 19th November, 1948. (647456.)

30208. Donovan Electrical Co., Ltd., and Hayward, W. H.—Electric switch mechanism of the metal-clad type. 19th November, 1949. (647333.)

32044. Victor Products (Wallsend), Ltd., and Mann, R. W.—Fastening devices for electric cable ends. 12th December, 1949. (647335.)

32975. Metropolitan-Vickers Electrical Co., Ltd.—Electric arc welding apparatus. 21st December, 1948. (647337.)

33498. Hoover, Ltd.—Spraying devices. 30th December, 1948. (647339.)

1950

4678. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Radio navigational aid systems. 31st December, 1947. (647579.)

Amended Specification

628367. Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—Method and arrangement for converting time-modulated electric pulses into amplitude-modulated pulses.

Street Lighting at Chorley

Fluorescent and Sodium Systems

A NEW street lighting installation covering some three miles of the A6 main road from London to Carlisle and Inverness where it passes through Chorley, Lancashire, was switched on by the Mayor of Chorley, Alderman G. B. Fletcher, on 26th October. Nearly three-quarters of a mile in the town centre is lighted by fluorescent lamps, while the remainder of the road within the borough boundaries is lighted by means of sodium lamps. All the lanterns, fluorescent and sodium lamps and control gear have been supplied by the General Electric Co., Ltd., whose lighting engineers collaborated with the designer of the scheme, Mr. H. D. C. Lowe, borough engineer and surveyor. The concrete columns were supplied by Concrete Utilities, Ltd., and the erection was carried out by Furze Electrical, Ltd. The complete system is remote controlled by the "Rythmatic" system of ripple control which has been installed for the North Western Electricity Board by the Automatic Telephone & Electric Co., Ltd., at the Board's substation. The Board will make an annual charge per lighting unit for the use of this control.

Part of the A6 road through the Borough of Chorley which is lighted by sodium lamps controlled by "Rythmatic" ripple control equipment

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—15th December. Brisbane City Council. 400 11 kV single-phase 50-c/s lightning arrestors. (C.R.E. (I.B.) 68787/50. Ten/1819.)*

Blackpool.—1st December. Corporation. Street lighting equipment for Class "A" and "B" roads. (See this issue.)

Bournemouth.—13th December. Corporation. Supply and erection of neon sign at the Pavilion. (See this issue.)

Darlington.—27th November. Corporation. Electrical installation at new Eastbourne county primary school. (See this issue.)

Denbighshire.—21st December. Education Authority. Electrical installations at primary and infants' schools. (See this issue.)

Egypt.—14th February. Mechanical and Electrical Department, Ministry of Public Works. 66 kV overhead transmission lines and three switching stations. (C.R.E. (I.B.) 69339/50. Ten/1824.)*

Greece.—ATHENS.—Greek Government. Design and supervision of construction of transmission lines, substations and distribution systems. (See 10th November issue.)

India.—15th December. Madras Electricity Department. Power line carrier current equipment and v.h.f. radio equipment for Machkund scheme. (C.R.E. (I.B.) 66623/50. Ten/1802.)*

Manchester.—15th December. Wythenshawe Estate Committee. Electrical installations in 38 shops, maisonettes and garages, Portway. (See this issue.)

Middlesbrough.—29th January. Tees Valley Water Board. Electrically driven pumping plant at the low lift and high lift pumping stations, together with meters, etc. T. S. R. Winter, general manager, Corporation Road.

New Zealand.—13th March, 1951. State Hydro-Electric Department. Auxiliary generator sets for Roxburgh power station. (C.R.E. (I.B.) 67647/50. Ten/1757.)*

Pakistan.—KARACHI.—15th January. Director General of Supply and Development. Transformers and switchgear. (See this issue.)

Poulton-le-Fylde.—30th November. U.D.C. Electrical installations in nineteen dwellings on three sites. Fairbrother, Hall & Hedges, architects, Barclays Bank Chambers, Birley Street, Blackpool.

Romford.—22nd November. Borough Council. Electrical installations in ninety-two two-storey houses, Masefield Crescent estate. Borough surveyor, Town Hall.

Ryton-on-Tyne.—U.D.C. Installation of electric lighting and heating in 46 houses on the Garden House estate. Surveyor, Council offices, Ryton.

South Africa.—JOHANNESBURG.—6th December. Railway Stores Department. One lifting magnet to lift one ton for operation on a 2-ton overhead electric crane. (C.R.E. (I.B.) 69968/50. Ten/1846.)*

Swinton & Pendlebury.—16th December. Borough Council. Street lighting, Manchester-Bolton road. (See this issue.)

United States.—1st May. United Nations, Lake Success. 2,500 headphones. (C.R.E. (I.B.) 68722/50. Ten/1811.)* 440 microphones. (C.R.E. (I.B.) 68723/50. Ten/1810.)*

Uruguay.—13th December. Usinas Electricas y Telefonos del Estado. Supply of 14,400 fluorescent lamps and accessories. (C.R.E. (I.B.) 68993/50. Ten/1830.)* 27th December. Main distributing frames, and protection strips for incoming cables. (C.R.E. (I.B.) 68991/50. Ten/1838.)*

West Bridgford.—4th December. U.D.C. Re-lighting part of Loughborough Road. (See this issue.)

ORDERS PLACED

Caterham & Warlingham.—Housing Committee. Recommended. Installation of electricity in 34 houses on the Queen's Park estate (£1,292).—Tree Electrical Co., Herne Hill.

Hendon.—Borough Council. Installation of fluorescent lighting at the Central Library (£606) and at Golders Green Library (£583).—General Electric Co., Ltd.

London.—L.C.C. Electrical installation in connection with adaptation of former Government training centre, Worsley Bridge Road, Sydenham, for use by the South East Technical College.—London Electricity Board (Southern Sub-Area).

Morecambe and Heysham.—Corporation. Installation of electrical fittings, etc., in twenty flats on the Blackberry Hall estate.—E. Hopps.

Newcastle - under - Lyme.—Corporation. Electrical installation at Bradwell county primary school (£1,662).—Midlands Electricity Board.

Newcastle-on-Tyne.—Education Committee. Electrical installation at Benton Park primary school (£4,434).—Drake and Gorham, Ltd. Installation at Lower Condercum special school (£242).—B. Berrie.

Warwick.—Electrical installation at Newbold county junior school.—F. L. Flinn, Coventry.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Banstead.—Flats (32), Preston Lane, Tadworth, for U.D.C.; A. W. Kenyon, architect, 15, Adeline Place, W.C.1.

Beyton.—Secondary modern school for West Suffolk E.C.; county architect, 13, Westgate Street, Bury St. Edmunds.

Biddulph (Staffs).—Houses (80) in 1951; U.D.C. surveyor.

Billingham-on-Tees.—Houses (110) for U.D.C.; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Offices, ablution block and canteen for Ashmore Benson Pease & Co., Ltd.; G. H. Jellicoe, architect, 12, Gower Street, London, W.C.1.

Bournemouth.—Houses (174), Longbarrow estate and Stourfield, Southbourne; W. L. Clowes, borough surveyor.

Burnley.—Aged persons' hostel; Hitchen, Pickup and Halsted, architects, 46, Manchester Road.

Burton Latimer (Northants).—Houses (24), between Findon and Miller Roads; U.D.C. surveyor.

Didcot.—Fire station, The Broadway, for the Berkshire and Reading Fire Authority; county architect, Wilton House, Parkside Road, Reading.

Doncaster.—Cement works on site between Cridling Stubbs and Womersley; Contract & Works Supplies Co., Ltd., Hallgate, Doncaster.

Driffield.—Rebuilding mills (£50,000); E. B. Bradshaw & Sons, millers, Bell Mills.

Durham.—New school, Birtley Brown's Buildings; Grenfell Baines Group, quantity surveyors, Simpasture, Newton Aycliffe.

Edgware.—Bakery and bread department, Stream Lane, for Brills Scotch Bakery; C. E. Owen Ward, architect, 1a, Aldermans Hill, N.13.

Enfield.—Flats (48), Pevensey Avenue; U.D.C. surveyor.

Factory, Lockfield Avenue, Ponders End; Geo. Cotton & Son, 313 Goswell Road, E.C.1.

Exeter.—Junior school, Stoke Hill; city architect.

Farnworth.—Houses (50), Plodder Lane estate, for U.D.C.; E. F. Davis, Ltd., Farnworth.

Gateshead.—Two county primary schools, Southend Road; chief architect, Municipal Buildings, Swinburne Street.

Gravesend.—Houses (48), Valley Drive; borough surveyor.

Guildford.—Dwellings (100), Bushy Hill estate; borough surveyor.

Halifax.—Second instalment of technical college extensions (£160,000); borough engineer.

Hamilton.—Ice-cream factory, Whistleberry Road (£120,000); Eldorado Ice Cream Co., Ltd., 64 Stamford Street, London, S.E.1.

Hull.—Rebuilding "Shell House," Ferensway (£60,000); Spooners, Ltd., Glebe Road, Stoneferry.

London.—CAMBERWELL.—Scheme for reinstatement of operating theatre, etc., at St. Giles' Hospital (£35,600); South East Metropolitan Regional Hospital Board, Portland Place, W.1.

HOLBORN.—Flats (64), Red Lion Square site; A. S. Cook, borough architect, Town Hall, W.C.1.

PADDINGTON.—Dwellings (226), Bishop's Road estate; borough engineer, Town Hall, W.2.

SOUTHWARK.—Flats (30), laundry, etc., Morley Street (£66,340); Taylor Woodrow Construction Co., Ltd., contractors, Adrienne Avenue, Southall.

Loughborough.—Houses (12), Broadway; L. Hopkins, 194, Forest Road, Loughborough.

Loughton.—Factory, Debden estate; Ozalid Co., Ltd., 62, London Wall, E.C.2.

Manchester.—Multi-storey flats with lifts at Northern Moor neighbourhood; city architect.

Newcastle-on-Tyne.—Children's home on Montagu estate; city architect, 18 Cloth Market.

New lighting department, Byker (£23,000); city architect.

Newton-le-Willows.—Additions for chest clinic at Cottage Hospital; regional architect, Liverpool Regional Hospital Board, Alder Hey Hospital, West Derby, Liverpool.

Northampton.—Erection of Far Cotton infants' school; H. Martin, Ltd., Thenford Street.

Northants.—Adaptation of Loddington Hall, near Kettering, as residential school; county architect, Northampton.

Oxford.—Slipper baths, offices, branch library, etc., Albert Street, St. Barnabas; city planning officer, Town Hall.

Plymouth.—Out-patients' department at Mount Gold Hospital; Louis de Soissons and Partners, architects, 5, Portland Square.

Prudhoe-on-Tyne.—Houses (80) for U.D.C.; W. C. Ireland, surveyor.

Robertsbridge (near Battle).—New ward block and extensions to nurses' home, Darvell Hall Sanatorium (£87,935); South East Metropolitan Regional Hospital Board, London.

Salford.—School, Duke Street; Cruikshank and Seward, architects, 16, Princess Street, Manchester.

Scunthorpe.—Key-workers' houses (200); borough surveyor, Municipal Offices, 34, High Street.

Shropshire.—First instalments of Oswestry and Oakengates technical colleges and temporary extensions at Shrewsbury Technical College; county architect, Shrewsbury.

Southend-on-Sea.—Four unit factories, industrial estate, Rayleigh Road; borough surveyor, Clarence Road.

South Shields.—Three-storey flats, Farding Square; Tate & Holmes, Ltd., builders, Benwell, Newcastle-on-Tyne.

First instalment of new technical college scheme (£100,000); borough engineer.

Stockton-on-Tees.—Pipe factory at the Malleable Works of the South Durham Steel & Iron Co., Ltd.; own architects.

Stoke-on-Trent.—Scheme for regional college of technology, art and commerce (first stage to cost £450,000); W. A. Bott, borough surveyor.

Tynemouth.—Additions to Tynemouth High School (£33,000); W. Stockdale, architect, Howard Street, North Shields.

Crematorium for the T.C. (£65,000); borough engineer, 16, Northumberland Square, North Shields.

West Bromwich.—Works extensions; Metal Productions, Ltd., Tantany Lane.